ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION

MAY 27, 1948

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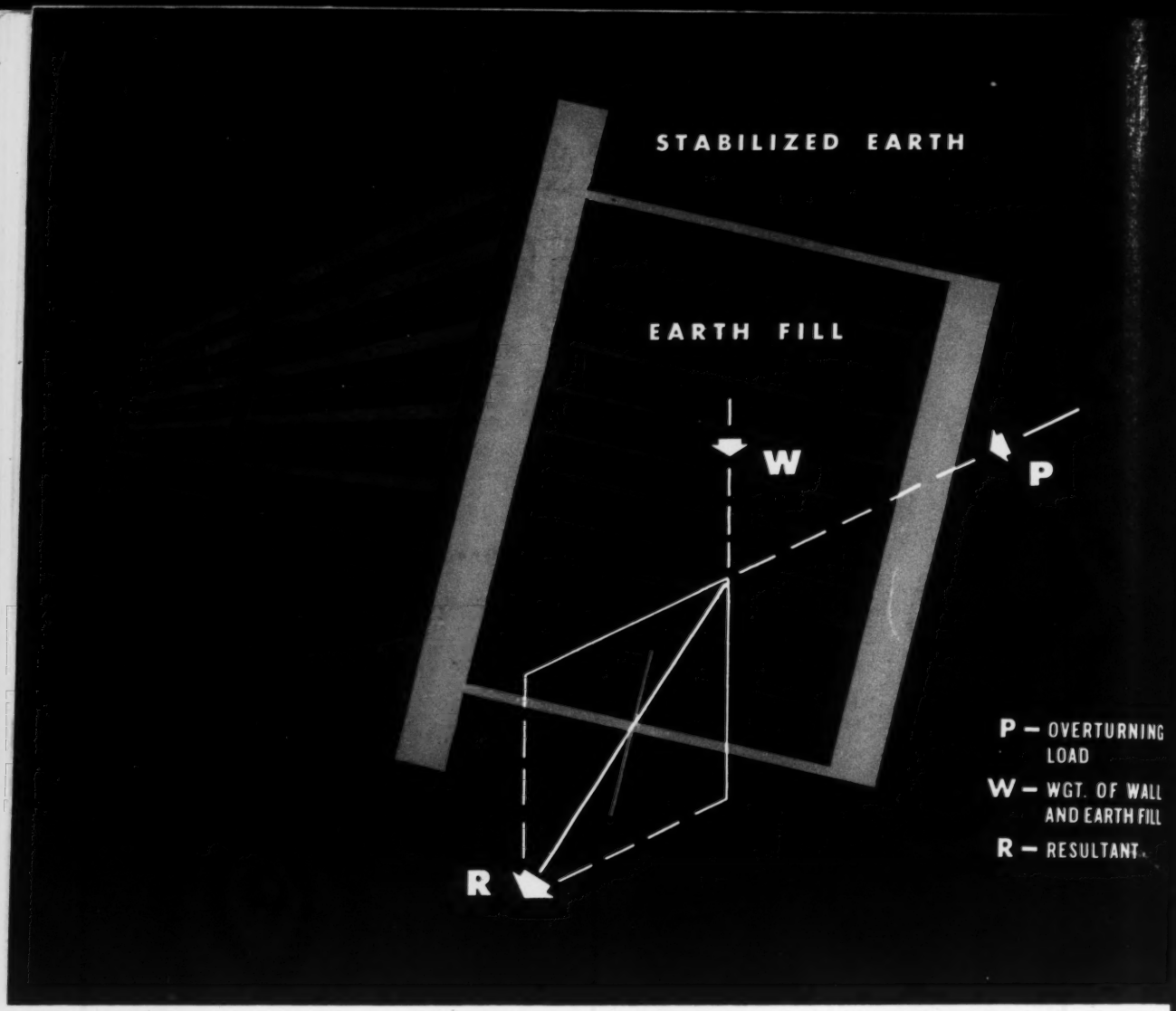
CONSTRUCTION COSTS ISSUE

PRICES OF MATERIALS

LABOR RATES AND PRODUCTIVITY

CONTRACTORS' BID PRICES

COST AND CONSTRUCTION INDEXES



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Volume 140 • Number 22

May 27, 1948

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FEATURES IN THIS ISSUE

News of the Week 69

Editorials 76

New York Builds an Expressway on Shelves 78

Steam Line Tunneled Beneath Six-Lane Street ..... G. W. HAMLIN 82

"Umbrella Trusses" Form Low-Weight Roof 84

CONSTRUCTION COST SECTION

Design of a Skyscraper Hospital 88

Freight Elevator Costs ..... W. W. BRYANT 93

Sewage Treatment Costs up 40 Percent 96

Construction Productivity Rising 98

Cost Trends for Low-Rent Projects 100

Construction Cost-Control Simplified ..... I. H. WINSLOW 102

See page 87 for detailed list of contents of the Construction Cost Section

DEPARTMENTS

Construction Trends 67

Comment and Discussion 86

New Aids 224

Manufacturers' Publications ... 254

Men and Jobs 264

Elections and Activities 270

Manufacturers' Activities 274

Engineering School News 280

Construction Reports 311

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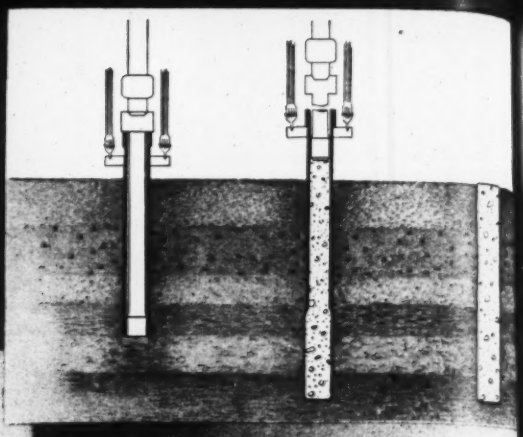
Foundation Security



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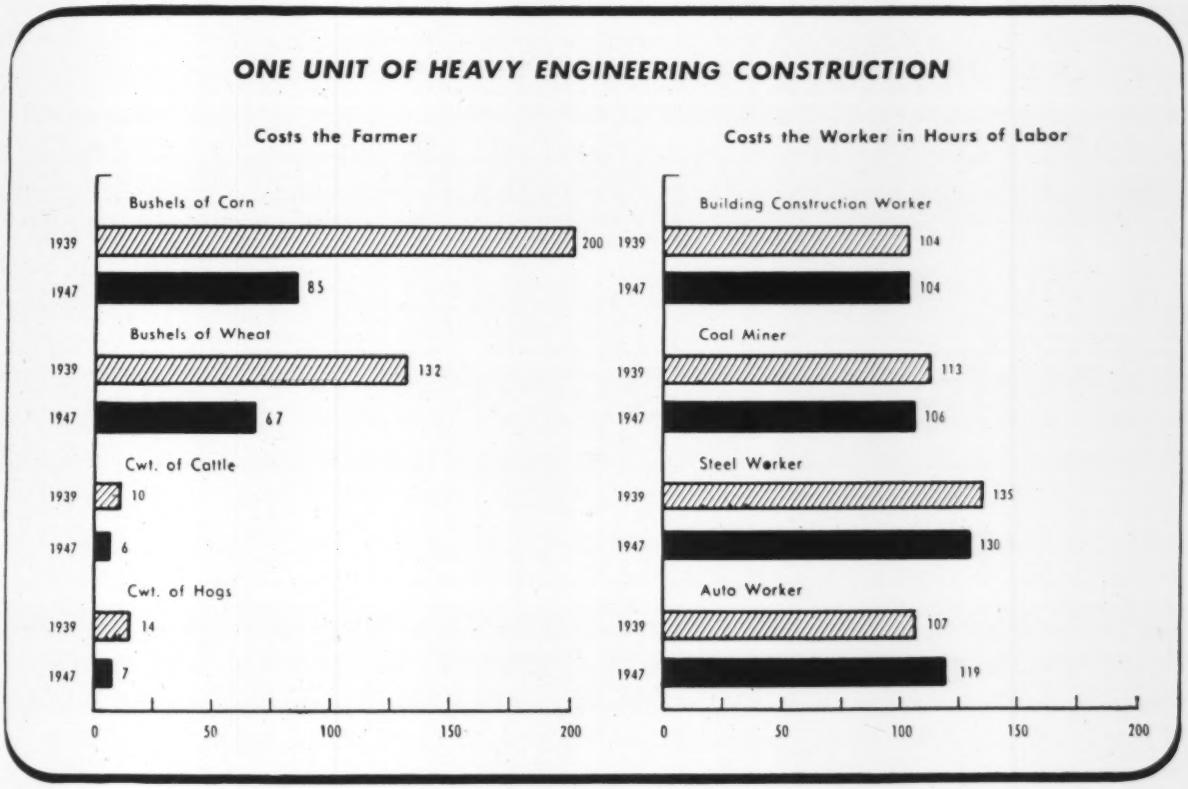
CONSTRUCTION TRENDS



Should Contractors Take to the Barter System?

Construction contractors, coping with complaints at every turn about high construction costs, could go back to a barter system and get some price comparisions in their favor.

Where construction is for the benefit of the farmer, for example; and assuming a construction cost rise of 75 percent over 1939, let us see what one unit of construction would cost the farmer.

In 1939		In 1947
200	bu. of corn	85
132	bu. of wheat	67
10	cwt. of good to choice steers	6
14	cwt. of good to choice hogs	7

On the same basis let us see what this same unit of construction would cost the individual worker in hours of his labor.

	In 1939	In 1947
The auto worker	107 hrs.	119
The steel worker	135 hrs.	130
The bituminous coal miner	113 hrs.	106
The building construction worker	104 hrs.	104

The increase assumed for construction costs is the increase in common construction labor wage rates and basic materials prices as measured by the *Engineering News-Record* Construction Cost Index. Assuming that construction productivity is such that the contractor's selling price has to be up 100 percent instead of the 75 percent rise in basic prices of labor and materials, the barter terms would be:

The Farmer

	1939	1947
Corn	200 bu.	97
Wheat	132 bu.	77
Steers	10 cwt.	7
Hogs	14 cwt.	8

The Industrial Worker

	1939	1947
Auto worker	107 hrs.	136
Steel worker	135 hrs.	149
Bituminous coal miner	113 hrs.	122
Building construction worker	104 hrs.	119

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News of the Week

ENGINEERING NEWS-RECORD • MAY 27, 1948 • VOLUME 140 • NUMBER 22

Outline highway network for European development

United Nations group makes tentative selection of 11,000-mi. network to serve western Europe and Germany—Construction standards approved

Western European countries working together in the United Nations have tentatively laid out the routes for an international highway network. Designed to facilitate long-haul traffic as an aid to European reconstruction, the highway system embraces through routes from the toe of the Italian boot to northernmost Sweden, and from the French coast to eastern points behind the Iron Curtain.

Representatives of six countries and the British and U. S. zones in Germany agreed upon the international net work and recommended uniform design standards for the through routes at a five-day meeting in Geneva last month. Belgium, Denmark, France, Italy, the Netherlands, Sweden and Switzerland were represented by officials holding positions in their own countries corresponding to that of the Commissioner of Public Roads in the United States. In addition to representatives from "Bizonia," in Germany, the meeting also had individual representation from the United States and the International Bank for Development and Reconstruction.

No mileage figures were furnished with the map of highway routes selected at the meeting, but the system appears to include some 10,000 miles of existing roads and about 1,500 miles of proposed routes. The routes in the area of Soviet dominance (the Russian zone in Germany, Poland, Czechoslovakia, Austria and Hungary) were merely suggested. No representatives from those countries participated in the meeting.

In an organization as huge as the United Nations, work on specific projects is broken down through committees and subcommittees. Officially, the Geneva meeting was conducted by the working party on highways of the Subcommittee on Road Transport. The latter group, in turn, is part of the Inland Transport Committee under the Economic Commission for Europe. Kaj Bang, division head in the Ministry of Transport, Denmark, was elected chairman of the working party on highways.

Development of the highway plan represents the second step in a program to improve freedom of truck traffic over European highways. The cooperating countries have been trying to eliminate restrictions to international truck movement, which they look upon as a flexible form of available transportation, particularly valuable in a period of reconstruction.

Informal agreement exists

Since December, the participating nations have had an informal reciprocity agreement to permit trucks to haul across international boundaries, eliminating the costly process of unloading and reloading freight at the borders. Made originally for six months, the agreement has been extended another six months, to the end of 1948.

In marking out the international highway system, road officials at the Geneva meeting expressed a general hope that the selected routes would be given priority in reconstruction of highways by the various governments. To promote better travel conditions on these routes, they set up recommended uniform standards for pavements and bridges.

Pavement Width—The meeting decided upon three classifications of highway pavement: (1) Two-lane roadways 7 meters (about 22 ft.) wide except in mountainous country, where the width can be reduced to 6 meters; (2) divided highways with two two-lane roadways 7 meters wide, separated by a median strip; (3) a provisional category of three-lane roadways where topographical, economic and financing con-

(*Continued on page 73*)

Penna. election favors construction unions

The first of a series of union-shop "pilot elections"—held in the construction industry resulted in an expected overwhelming approval of five construction unions as bargaining agents with contractors.

The elections (*ENR* May 13, vol. p. 88) were held over an area covering 33 western Pennsylvania counties, with headquarters at Pittsburgh. Conducted by agents of the National Labor Relations Board, the balloting covered employees of the Construction Association of Western Pennsylvania, with only one question being asked—whether the men would authorize one of five unions to act as their agent in bargaining negotiations.

A tabulation of votes last week showed:

Teamsters, 179 for the union; 20 against; carpenters, 352 in favor, 10 against; pile drivers, dock and wharf builders, unanimously in favor; laborers, 1,136 in favor, 203 against; operating engineers, 489 in favor, 36 against.

Engineers repair damage to Peace River Bridge

Canadian army and civilian engineers worked under seven feet of ice last winter to build a steel cofferdam to save the Peace River bridge on the Alaska highway, after the structure was damaged by flood waters. The work was pronounced a success last week.

The engineers' fight began last year when experts discovered that the $4,000,000 suspension span, 2,100 ft. long, was in danger of crashing down because the swift waters had undermined one of the 250-ft. towers and caused it to lean 14 inches out of line. The engineers' race was against both water and ice. They feared that if the spring thaw broke the ice before their dam was in place to stop further erosion the huge blocks of ice might knock the pier off its foundation.

It was touch and go for a long time but the last piece of steel was sunk into the riverbed a few days before the thaw. Shortly, 1,000 cu.yd. of concrete will reinforce the leaning tower to complete the work.

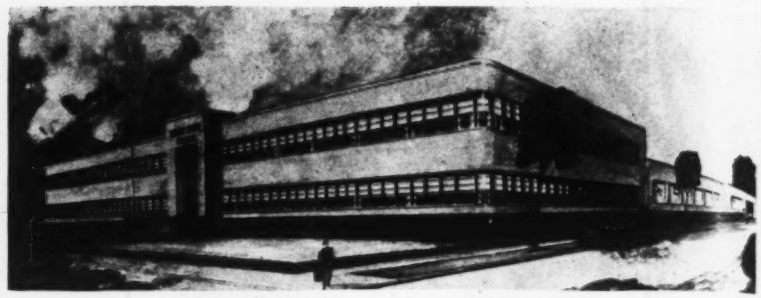
NEWS IN BRIEF

In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Public Construction—Maurice T. Reed Const. Co. has been awarded a $1,596,300 contract for building *Mississippi* state schools for the deaf and blind near *Fondren* . . . The Omaha, Neb., office of the Corps of Engineers asks bids for construction work at the *Wichita, Kan.*, municipal airport . . . *Watertown, N. Y.*, voters have approved a $2,000,000 bond issue for a new senior high school . . . An $1,850,000 addition to the laboratory at Iowa State College, *Ames*, has been authorized by the Atomic Energy Commission . . . *Milwaukee, Wis.*, is to have a new $1,000,000 Jewish community center on the southwest corner of N. 4th St. and W. Kilbourn Ave. . . . Bids will be received June 7 for a $2,000,000 building for the Texas State University for Negroes, *Houston*. . . . Bids will be asked for soon on an 8-classroom section at the Southwestern Institute of Technology, *Weatherford, Okla.* . . . Architects have made plans for a $1,000,000 field house at Kansas State College, *Manhattan, Kan.*

Highways—Low bids totaling $1,102,241 on 15 road and bridge maintenance contracts were received May 11 by the *Indiana* state highway board. . . . Frost and spring floods caused an estimated damage of $2,622,000 to the highway system of *Ohio* . . . The last of the seven masonry piers for the new *Memphis, Tenn.*, bridge over the Mississippi River was completed last month. The piers cost $4,300,000 . . . A six-mile stretch of the new *Baltimore, Md.*—Washington, D. C., freeway will be advertised for bids by June 15 . . . Bids will be opened June 18 for construction of a $1,800,000 steel cantilever bridge over the Columbia River at *Wenatchee, Wash.* . . . Recent floods caused $1,500,000 damage to highways in *Saskatchewan* . . . The Wisconsin state highway commission and *Milwaukee, Wis.*, have agreed tentatively to hire consulting engineers to determine the location and preliminary design of proposed expressways.

Sewers and Water Supply—*Spokane, Wash.*, will open bids June 3 for a $2,000,000 intercepting sewer system . . . The Mahoning Valley Sanitary District, which sells water to *Youngstown, Niles* and *McDonald, Ohio*, has asked the federal government for permission to tap the Berlin Dam reservoir . . . Fiske-Carter Const. Co., Spartanburg, S. C., has a $260,000 contract for water works and filter plant at *Laurens, S. C.* . . . *Bogalusa, La.*, will vote July 6 on a $1,000,000 bond issue for improvements to include sewer and water extensions . . . *Tulsa*, Okla., has voted $15,750,000 in bonds to get an additional 45,000,000 gal. of water from Spavinam Creek, 65 miles to the northeast.



ADMINISTRATION BUILDING—Constructed and equipped at a cost of $1,500,000, headquarters for the Independent Pneumatic Tool Co. at Aurora, Ill., provides 40,000 sq. ft. of office space on two floors and 35,000 sq. ft. for machine shop, factory and steel storage. The building is equipped for air conditioning, radiant heating and flush-type, fluorescent lighting in continuous diagonal lengths. All sash are double-glazed with heat-resisting glass. Ceilings in most rooms in the office and engineering departments are composed of metal-pan type acoustical tiles suspended from floor and roof. Engineers were A. Epstein and Sons, Inc., Chicago, with E. B. Mathewson Co. as associate; Sumner S. Sollitt & Co. were general contractors.

Labor—A plumbers' strike at *Oshkosh, Wis.*, ended with a compromise on a 30-cent-an-hour boost to $1.95 . . . Wages of plumbers and pipefitters at *Seattle, Wash.*, will be increased to $2.50 an hour . . . A wage boost of 13¾ cents an hour for six basic AFL building trades unions has been approved for the region from *San Luis Obispo* to *San Diego, Calif.*

Industrial Construction—Work will start soon on a $1,500,000 office building for Lowich Brothers at *Dallas, Tex.* . . . Battelstein's, Inc., has awarded a contract to Tellepsen Const. Co. to build a five-story, $1,000,000 addition to its store at *Houston, Tex.*, and in the same city, Linbeck & Dedirich Const. Co. has a contract to build a $2,000,000 F. W. Woolworth Co. store.

Miscellany—The *Boston, Mass.*, housing authority plans to spend the full $20,000,000 for housing units granted by the city council . . . Construction of 500 housing units for veterans is in progress within the municipality of *Burnaby, B. C.* . . . The Aluminum Co. of America has announced plans for the erection of an aluminum producing plant at *Point Comfort*, near *Port Lavaca, Tex.*

N. Y. Housing Authority plans home-cost forum

A three-day discussion in regard to the production of homes in the $7,000 to $10,000 class and apartments for rental from $50 to $75, will be held in New York City, June 2 to 4.

The meeting, to be held at the Hotel Pennsylvania, is sponsored by the New York State Division of Housing, with the collaboration of the state chapter of the American Institute of Architects, the State Association of Architects, the State Association of Engineering Colleges, the Regional Plan Association, and the State Federation of official Planning Boards.

State Housing Commissioner Herman T. Stichman said in announcing the programs that housing and planning officials from several parts of the United States will meet with leaders of all segments of the construction industry and labor unions to seek an answer to the question of why private home-building is lagging. Another purpose of the meeting will be to get suggestions for a long-range program to avoid what Mr. Stickman called "booms and busts" in the house-building industry.

Conclusions of the meeting will be worked out in part in the State Housing Authority's Bell Park Garden Development in suburban Queens, where some 800 apartments are now under construction for occupation by veterans.

Speakers will attempt to outline means of ending wasteful building practices, modernization of building codes, and the use of new techniques and materials for faster, cheaper building.

Speakers will represent all of the sponsoring organizations and many of the contractors and builders groups in the region.

Canada engineers act on labor code

Canadian engineering groups have placed opposing views before a Parliament committee considering provisions of a new national labor code.

Although labor legislation is generally the responsibility of Canadian provinces, the national code—which is to replace wartime legislation—will apply to labor in all national undertakings such as railways, and will probably be adopted by some of the provinces for local application.

The wartime code permitted groups of engineers to associate themselves for collective bargaining purposes. This was done in the provinces of Ontario and Quebec with some success, with the approval of the provincial associations of professional engineers. The same right was accorded to engineers in a draft of a new national code which was introduced into the Canadian parliament last year but never enacted.

When hearings began on the measure now under consideration, conflicting testimony was presented to the committee as to the desires of engineers. The Canadian Council of Professional Engineers and Scientists, representing fourteen professional organizations, requested that engineers be again granted the right, under the code, to bargain collectively and that they not be omitted from the law as are physicians and dentists. The Engineering Institute of Canada, however, requested that engineers be excluded from the code in the same manner as are the other learned professions.

Members of the House of Commons' Industrial Relations Committee were said to have been deluged with representations on the matter, and at a recent meeting the group decided to exclude engineers from the code in accordance with the views of the Engineering Institute.

Later, the committee took under consideration but did not act upon a motion to the effect that engineers working for a single employer may form a "professional association" to bargain collectively.

Discussing the controversy, Labor Minister Mitchell said that omission of engineers from the code would not prevent professional groups from organizing. He added that, if requested, he would use the machinery of his department to assist engineers in this work.

Big Canadian power projects get under way

The Hydro Electric Power Commission of Ontario has started construction of another new and major power development project—its $25,000,000 dam and plant at Chenaux on the Ottawa River, about 16 miles north of Renfrew, Ont. Eventually the project will develop 160,000 hp.

Completion is scheduled for about 2½ years hence. The general construction contract has been awarded to Pentagon Construction, headed by C. H. Gordon of Montreal.

Discussions have just been held by officials of the Ontario Hydro Electric Commission and the Hydraulic Resources Department of Quebec regarding the power development on the upper Ottawa River (*ENR* April 29, vol. p. 615). Work started about a year ago on a $51,000,000 power project at Des Joachims and a project at Cave et Fourneaux is expected to be started soon. The combined capacity of these plants will amount to 855,000 hp.

In 1942 the provinces of Ontario and Quebec agreed to exchange power rights at several of these jointly-owned sites instead of having a joint development at separate power plants at each one, as was proposed when development work started.

Furman Shoals project to start next year

The Georgia Power Company will start construction of the $10,000,000 Furman Shoals hydroelectric project next year with completion scheduled for 1951, according to C. B. McManus, president. Agreement has been reached between the utility and the Federal Power Commission, for a project to be located about four miles north of Milledgeville, Ga.

The company began construction on the project in 1929 but discontinued it at the end of 1930 because of the business depression. The FPC has now issued a new 50-year license and agreement has been reached on details of construction and control of flow of the Oconee River.

The dam, which will be a combination structure of masonry and earth fill, will be about 100 ft. high and 3,000 ft. long. The power house, on the west side of the river, will have a reinforced concrete substructure and a steel and brick superstructure. It will contain two generating units having a combined capacity of 45,000 kw.

Water backed up by the dam will form a lake of about 15,000 acres. Power from the project will be distributed in the area between Macon and Augusta.

Lt. Gen. R. A. Wheeler announces retirement

Corps of Engineers Chief to Complete 41 years of Service—Was U. S. Commander in India-Burma theater

Lt. Gen. Raymond A. Wheeler, chief of the Army Corps of Engineers, will retire from active duty on June 30, after two and one-half years as head of the Army construction forces.

An Army announcement of General Wheeler's impending relief from duty last week contained no information as to his successor.

General Wheeler, 63, will end an Army career extending over 41 years, and including service in two world conflicts. A native of Peoria, Ill., he was a 1911 graduate of West Point, and was immediately assigned to the Isthmian Canal Commission, Panama Canal Zone in 1911 and 1912. He later served in Mexico in 1914, and then went overseas with the 4th Engineers in World War I.

He served two later tours of duty in the Canal Zone—in 1927 as assitant engineer of maintenance, and in 1940 as engineer of maintenance. In 1941 he was recalled to Washington to become assistant chief of staff, supply division. Additionally, he served in the various district and division offices, and on the Board of Engineers for Rivers and Harbors.

During the war years that followed, he was in charge of the Asia Supply Command, handling supplies for Russia, British forces in India, Chinese, and U. S. forces in the area. When the war ended, General Wheeler was commanding general of United States Forces in the India-Burma theater, as well as deputy supreme allied commander of the Southeast Asia Command.

He was recalled to the United States as Chief of Engineers on Oct. 1, 1945.

Random Lines from an editor's notebook . . .

. . . In which a globe-trotting engineer mentions some things to be expected when you accept a foreign engineering bid

Sinclair O. Harper, for many years chief engineer, U. S. Bureau of Reclamation, has, since his retirement from government service, been a consultant on several foreign projects. News items from time to time have mentioned that he was serving on engineering commissions in Afghanistan, in Egypt or in India. Therefore, a chance to question him offered a real opportunity. An interview elicited the following:

Many natives of other countries who come here to study, return, after graduation, to positions of responsibility in their own lands. These men stimulate a demand on the part of their governments for bringing in American consultants. Thus when the consultant arrives in a foreign capital, he may be greeted by a graduate of Cornell, Stanford, or California.

The American engineer will find foreign engineers, as a rule, highly educated, well versed in theory and speaking English fluently. Usually they lack first-hand experience in modern construction methods and the use of heavy construction equipment such as has been developed in the United States in recent decades. However, they have a good knowledge of major U. S. engineering projects acquired from technical periodicals and literature.

They admire American speed, efficiency and "know-how," such as many of them saw in the construction operations of our overseas military forces during the war. They are anxious to learn how to apply U. S. methods to the works projects in their countries.

Hints on inoculations

It is sometimes difficult to obtain full information about desirable or compulsary inoculations for entry into various countries. A half dozen or so of these (according to where you go) are highly advisable preventive measures. Offices of overseas airlines are the best source of information. In the Mediterranean, Mideastern and Asiatic countries smallpox, cholera, typhus and typhoid inoculations are a "must." To provide for adequate intervening intervals, about a month should be allowed for taking them the first time. Passports and visas usually can be obtained during this period. Arranging subsequent trips takes much less time, but it should be remembered that most inoculations are good for only about 2 years.

Finances should have forethought. Travelers checks are accepted in all countries, but it is advisable to have about $100 in United States small bills for use en route, particularly on the return trip, at airports, and for unforeseen stopovers. The United States dollar is the only money that is good everywhere. Travelers checks should be cashed in local currency only in amounts that will be spent immediately.

DISCUSS FOREIGN ENGINEERING—E. M. Knapik (left) San Francisco consulting engineer, and Mr. Harper, former USBR chief engineer, inspect the Friant-Kern canal and talk about foreign engineering.

In foreign lands it is usually impossible to exchange foreign currencies for United States dollars, and very difficult to get United States dollars in exchange for travelers checks. In Cairo last year, you might find a curbstone money changer who would give you about 45 United States dollar bills for a $50 travelers check. The traveler should avoid accumulating local currency but should conserve a sufficient supply of United States dollar bills for the return trip. It is also desirable to have a good supply of travelers checks in small denominations.

It will be well to determine the prevailing rate of exchange from a reliable source before parting with a travelers check. Exchange rates are now probably fairly well stabilized in most countries, but there have been cases where a hotel would allow for a check only 75 percent of the amount that could be obtained across the street.

The problem of food

Food in far eastern countries may be a minor or a major problem, depending on whether you are in a large city or in the back country. If you are fortunate enough to be domiciled in such famous hotels as Shepheards in Cairo, Falettis in Lahore or the Taj Mahal in Bombay you will find food and service comparing favorably with European standards. If you are spending much time in the back country it is a different story. The orthodox Hindu does not eat meat. He makes up for this by extremely high seasoning and you can expect his staple foods to be "hotter" than Mexican or Spanish dishes. The Moslem, on the other hand, uses all meats except pork, and his favorite dish is a combination of rice cooked with fat mutton.

Your hosts will do their best to provide palatable food, even in the back country of India or Afghanistan. However, on an extended field trip it will be highly advisable to take along a good supply of staple canned foods.

Water probably will be more of a problem than food. In first-class hotels, safe drinking water is usually available; in remote regions it is always under suspicion. It is well to carry a canteen and a supply of Halazone tablets. Two of these tablets allowed to stand 30 min. in a quart of water will make a highly unpalatable drink but will give you the consolation that the bad taste means protection. Despite every precaution, if you stay long enough in some of these countries you are almost sure to contract some form of dysentery.

U. S. engineers respected abroad

On the whole, a foreign engineering job can be a most interesting experience. The American engineer is shown every courtesy and consideration, and his hosts leave nothing undone to make his stay with them pleasant and memorable. He will be entertained in their homes and clubs, and taken on tours of engineering and historical interest.

In Egypt the engineer will be impressed by the remarkable accomplishments in the Valley of the Nile.

In India one is impressed by the tremendous water resources in the numerous great rivers, some of which carry more water than the Mississippi, and the marvelous work accomplished in the last 100 years by the Indian Irrigation Service (established by British engineers) in constructing and operating works that irrigate some 75,000,000 acres of land. There are unlimited possibilities for further utilization of the water and power resources of Indian rivers by the construction of high dams and power plants on many of the larger streams.

Mr. Harper found in the countries he visited that the best known American engineer was John L. Savage, formerly chief designing engineer, U. S. Bureau of Reclamation. . . . N. A. B.

House committee attack on Michael Straus fails

An effort to oust Reclamation Commissioner Michael Straus and Regional Director Richard Boke collapsed quickly last week when the House of Representatives refused to write into the Interior Department Appropriations bill a restriction on using those funds to pay a Commissioner or a regional director who is not an engineer.

It is no secret in Washington that the investigating subcommittee, headed by Representative Forest Harness of Indiana is trying to build up an impeachment case against Mr. Straus and Mr. Boke, now California regional director for the bureau.

Urged stopping salaries

After examining the Reclamation records for weeks, the group recently opened formal hearings, with Senator Sheridan Downey of California as the first witness. After hearing Senator Downey, Mr. Harness suddenly requested the House Appropriations Committee to prevent the Interior Department from paying salaries to Straus and Boke during the fiscal year starting July 1. The Appropriations Committee was completing its consideration of the annual Interior appropriation bill at the time.

Mr. Harness, who said he was acting with the full support of his subcommittee, asked that a provision be written into the Interior bill forbidding salary payments to the holder of the positions held by Mr. Straus and Mr. Boke if they are not engineer. Neither is an engineer.

At least one other high official of the Interior Department—William E. Warne, Assistant Secretary of the Interior, former Assistant Commissioner of the Reclamation Bureau—might also be affected by such a restriction. Like Mr. Straus, Mr. Warne is a former newspaper man.

Members of the appropriations committee refused the request and the Interior bill, which may reach the House floor this week, will contain no such restrictions on reclamation funds.

Meanwhile, both Secretary Krug of the Interior Department and Mr. Straus protested vigorously. Mr. Krug blasted the Harness subcommittee for what he termed one-sided action, pointing out that only Senator Downey had been heard during the investigation. Mr. Straus charged that the California senator was merely pursuing his efforts—so far unsuccessful—to upset the 160-acre limitation on farms receiving federal irrigation water. In reply to these charges, the subcommittee said it had advised both the Secretary and Mr. Straus that they would be heard "later". The group also challenged the accusation that it had acted only on the testimony of Senator Downey. Staff members hinted that they had uncovered "interesting" data during their probe of bureau records.

Low bids are received on Augusta, Me., bridge

Low bids of $1,063,055 for the superstructure and $376,921 for the substructure of the Kennebec River bridge at Augusta, Me., (*ENR* April 29, vol. p. 621) were received May 12 by the Maine Highway Commission. The former bid was made by the American Bridge Co., Boston, Mass., and the latter by W. H. Hinman, Inc., North Anson, Me. There were 12 estimates on the two contracts.

Lucius D Barrows, chief engineer for the commission, said the low bids would be accepted and then approval sought from the U. S. Public Roads Administration.

Los Angeles has plans for power developments

Los Angeles Water and Power commissioners have voted a $40,000,000 bond issue for hydroelectric plants in the Owens River Gorge. The project, to be completed in 1951 calls for erection of three 37,500 kw. plants, the raising of Long Valley Dam impounding Crowley Lake 20 ft. to increase storage capacity from 183,000 to 315,000 acre ft., construction of a 250-mi. transmission line, the building of 58,000 ft. of concrete-lined tunnel, and the construction of small diversion dams below each plant.

The Department of Water and Power probably will build the tunnels, the water regulating dams and the extension to Long Valley dam with its own construction facilities.

The bond issue, which is part of a $154,000,000 system expansion program, is subject to approval by the mayor and the city council.

The Department has also taken preliminary steps toward the construction of six hydro-electric power plants on the Kings River east of Fresno.

Outline European highway network

(*Continued from page 69*)

siderations make them necessary. The three-lane pavements would be 10½ meters (34¼ ft.) wide, or in rare exceptions, 9 meters, where narrower width is unavoidable. For the third category, the standards call for clear marking of the three lanes, with channeling of traffic into two marked lanes at curves and summits where necessary.

Participating governments are requested to furnish to the central coordinating group all available data regarding: (1) The daily average and peak-hour traffic volumes that justify construction of the various classes of roads, and (2) estimates of future traffic on all roads of the highway network within their jurisdictions.

Roads of the international network should bypass cities and towns but should provide easy access to main centers, the group decided. Ribbon (roadside) development along the bypass routes should be prohibited. Where required, the meeting recommended construction of separate sidewalks or paths for pedestrian and bicycle use.

Bridges—It was agreed that width of roadway on bridges and approaches should be the same as on the highways leading to the structures. This recommendation was accepted against the advice of the United States, which argued for a bridge width equal to roadway plus shoulders.

Load capacity of bridges should be uniform for the entire international network, the group declared. A working party on road traffic conditions is to determine the standard limitations for vehicles on the international system of roads: Gross load, axle load, axle spacing and vehicle dimensions.

A rule was established that highway crossings at grade should be barred on new construction and should be eliminated on existing improved roads of the international system where they hamper traffic or create hazards. For existing intersections at grade, the committee recommended that measures be taken to facilitate traffic flow and to prevent accidents.

Because of the great variation in topographic conditions, the highway group believed that it was not possible to establish minimum requirements for horizontal and vertical curves on the international system. It recommended that highway engineers design the arterial roads for uniform vehicle speeds over as long distances as possible. Further, it stressed the importance to safety of long sight distances. The nations represented were asked to report their plans with regard to designing for specified vehicle speeds.

The working party on highways set July 12 as the date for its next meeting.

Make aerial surveys of Canadian North

The Canadian government has already started its annual program of exploration and mapping of the Canadian North, with the announcement that the Royal Canadian Air Force has a number of photographic survey detachments in action.

Two other survey groups, from Aerial Photo Squadron 413, left Ottawa on May 13 for Fort Chimo, on Ungava Bay in Baffin Strait. At that point the group will cover 148,700 sq. miles of northern country with tri-camera photography and 20,000 sq. miles with vertical photography.

Topographical surveys on land will also proceed in many parts of the North as a part of the regular activity of the Department of Mines and Resources. Other activities of this department include surveys of industrial mineral deposits and operation of 57 geological survey parties. Geological studies will be made for an international flood control project on the Columbia River and the Geodetic Survey will conduct triangulation work in the Yukon, adjacent to the Alaska Highway, and in the far north of Quebec and Labrador in connection with great iron ore discoveries in that region.

Other special investigations include one already concluded—a special RCAF flight of 21 engineers and scientists across the entire north of the Dominion. Among the scientific tasks accomplished was a survey of ice conditions in Hudson Bay.

Gen. Heavey to manage Port of Houston, Tex.

Brig. Gen. William F. Heavey, consulting engineer for the Marine and Aviation Department of New York City, has been appointed port director and general manager of the Port of Houston, Tex., effective June 16.

General Heavey has a degree in civil engineering from the Massachusetts Institute of Technology. He served 30 years in the Army before his retirement from it last year. His Army service included engineering work in 87 landings in the last war, initial construction of overseas bases and five veterans' hospitals. He also served two years as New York district Army engineer.

As consulting engineer of New York's Marine and Aviation Department he helped incorporate the city's airport facilities into a master plan supervised by the Bi-State Port of New York Authority.

A. I. A. plans for survey of public buildings

In order to promote the erection of better public buildings, a special committee of the American Institute of Architects is launching a nationwide study. James W. Kideney of Buffalo, N. Y., chairman of the institute's committee, has sent invitations to civic, planning, legal and building groups concerned with such structures asking for cooperation.

Five general objectives of the A.I.A. study are: To improve the character of housing for governmental functions; to anticipate trends which may result in changes during the life of the building; to provide for better conformity of such planning to over-all regional and urban planning; to improve the efficiency of government buildings and to lower their costs; and to aid in the improvement of public relations and public education in civic responsibility by means of improved character and quality of the planning and design.

Cooperating with Mr. Kideney in making the survey are Prof. Walter F. Bogner of Cambridge, Mass., and Perry C. Smith of New York City.

High intensity lights ordered for two airports

A contract for high-intensity approach lights to be installed at Washington National and Los Angeles Municipal airports has been awarded by the Civil Aeronautics Administration.

Used in conjunction with the CAA instrument landing system, the high-intensity lights will help pilots to orient themselves in the final stages of low-visibility approaches. The pilot will be able to see the lights through a moderate depth of fog, and make the last part of his landing approach without use of instruments.

The Washington and Los Angeles installations will be the first for regular civilian aviation use, although several experimental and military high-intensity systems have been operated for some time. Each installation costs about $100,000.

The contract for 61 of the lights, which cost $700 each, went to the American Gas Accumulator Co. of Elizabeth, N. J.

The contract with the American Gas Accumulator Co. calls for delivery of the lights in September. If other necessary equipment can be manufactured and delivered in time, the two installations will be ready late next fall.

Schedule progress report on waste research

Research progress in the fields of water, sewage and industrial wastes will be the subject of a two-day discussion in Cincinnati on June 14 and 15.

The meeting is being sponsored by the sanitation study section of the National Institute of Health, along with the Water and Sanitation Investigations Station of the U. S. Public Health Service and the Cincinnati section of the American Society of Civil Engineers.

Details of the meeting and hotel reservations may be obtained by addressing C. C. Ruchhoft, U. S. Public Health Service, East 3rd and Kilgour Sts., Cincinnati 2, Ohio.

Bill would give states more hospital funds

A bill is now before Congress to amend the Hospital Survey and Construction Act (*ENR* Sept. 26, 1946, vol. p. 412) so that every state would receive at least $250,000 of federal aid for hospital construction. At present, the act provides that any state with an approved plan for construction of hospitals and public health centers is entitled to an annual allotment out of which federal assistance is payable to public and other nonprofit agencies for construction of hospital facilities.

Each state's allotment is determined by a formula written into the law based on population and per capita income. This formula limits the allotments of a few states to amounts insufficient to undertake any adequate hospital construction program. The new allotment, $250,000, will enable any state to build up its hospital facilities to some extent.

Affected by the proposal are: Alaska, Delaware, Hawaii, Montana, Nevada, Vermont and Wyoming. The total additional amount required to raise the allotments of these states to $250,000 each is $758,050.

In reporting the bill for action, the House Committee on Interstate and Foreign Commerce said that this amount would be slight compared with the overall cost of the hospital survey and construction provisions of the Public Health Service Act, which now authorizes appropriations for five years of $75,000,000 annually for hospital construction. The amendment would make possible the increased allotments to these few states without having to reduce allotments to the remaining states.

To date, 260 construction applications totaling $126,883,146 have been approved by the Public Health Service.

OBITUARY

Roland C. Ingram died in Seward, Alaska, on April 30. He was employed by the Public Roads Administration in Alaska for the last 24 years, 20 of which was as resident engineer in charge of all Public Roads Administration work in Western Alaska.

John H. Keller, 53, civil engineer of Niagara Falls, N. Y., died May 16. Formerly he was engaged in engineering capacities with the Niagara Falls Power Co., E. I. duPont de Nemours & Co., and the North American Cyanamid, Ltd. In 1925 he served as president of Anthony Lashier & Co., general contractors. For the last several years he had his own engineering business.

J. S. Allen, 82, retired chief engineer of the board of Mississippi levee commissioners, died May 12 in Greenville, Miss. He retired in 1946, but was a consultant of the board at the time of his death.

Louis E. Reber, 90, a graduate of M. I. T., former dean of the school of engineering at Pennsylvania State College, and father of the University of Wisconsin extension division, died May 11 at West Palm Beach, Fla.

Charles LeCocq, 49, resident engineer for the Washington State Highway Department at Bellingham for the last five years, died in that city May 17. A civil engineering graduate of the University of South Dakota, he had been with the department for 22 years.

Ernest R. Weileman, Sr., design engineer, died in Knoxville, Tenn., May 14. He was a native of Switzerland and came to the United States in 1907. He was chief designing engineer for the consulting engineering company of Mees & Mees, Inc., of Charlotte, N. C. Later he was associated with Phoenix Engineering Corp., of New York and served as a consulting engineer with the U. S. Corps of Engineers at Fort Lincoln, Bismarck, N. D. He joined TVA in 1936.

Everett Clerc Smith, 63, civil engineer with the Veterans' Administration, died May 16 in Washington, D. C. Mr. Smith, who lived in Bethesda, Md., was assistant to F. H. Dryden, in charge of Veterans' Administration construction, supply and real estate. He received a civil engineering degree from West Virginia University and worked on the Panama Canal from 1910 to 1916. He was in the Corps of Engineers during World War I. At one time he was deputy state administrator and chief engineer in the Philadelphia regional office of WPA. He had been with Veterans' Administration since 1946.

Road show registration reported over 40,000

Road builders representing 45 countries are among the more than 40,000 members of the highway industry who have already made reservations for the 1948 Road Show, according to Charles M. Upham, engineer-director of the American Road Builders Association.

The show will be held on a 30-acre plot at Soldier Field, Chicago, July 16-24.

Concurrent meetings of the ARBA Divisions will begin on Sunday, July 18, with the Educational Division and Student Chapters, and will continue through July 22.

Power plant work starts on Snake River, Idaho

Morrison-Knudson Co., Boise, Idaho, has begun preliminary construction of Idaho Power Co.'s new $11,500,000 hydroelectric project on the Snake River six miles west of Bliss, Idaho.

The company has finished construction of a road into the Snake River canyon to the projects site, has completed the cofferdam and had nearly completed camp construction by the middle of May. The dam will be 95 ft. high and 600 ft. in length and will back up waters of the river for about 5 miles.

MAJOR MEETINGS

Engineering Institute of Canada, 62nd annual meeting, Banff Springs Hotel, Alberta, June 1-5.

National Conference of Community Planning, annual meeting, Banff Springs Hotel, Banff, Alta., June 2-5.

American Society for Engineering Education, 56th annual meeting, University of Texas, Austin, Tex., June 14-18.

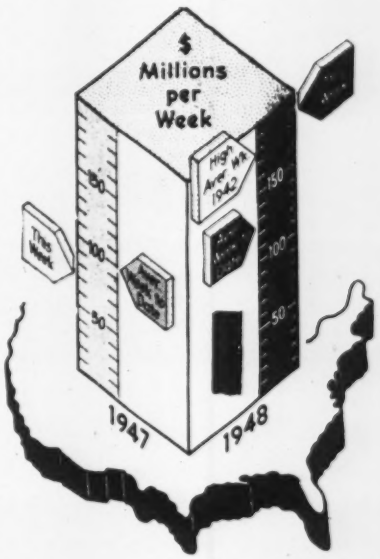
National Association of County Officials, Annual conference, Hotel George Washington, Jacksonville, Fla., June 21-23.

American Society for Testing Materials, annual meeting, Hotel Book-Cadillac, Detroit, Mich., June 21-25.

American Road Builders Show, Soldier Field, Chicago, Ill., July 16-24.

American Society of Civil Engineers, Annual convention, Hotel Olympic, Seattle, Wash., July 21-23.

CONSTRUCTION ACTIVITY



As Reported this week to . . .
Engineering News-Record

CONTRACT VOLUME

Continental U. S. Only
(Thousands of Dollars)

	Week of May 27 1948	Cumulative 1948 (22 wks.)	Cumulative 1947 (22 wks.)
Federal	$19,754	$468,916	$226,117
State & Mun.	70,636	974,581	640,047
Total Public	$90,390	$1,443,497	$866,164
Total Private	99,513	1,293,540	1,290,526
U. S. Total	**$189,903**	**$2,737,037**	**$2,156,690**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1948 (22 wks.)	Cumulative 1947 (22 wks.)
Waterworks	$25,723	$92,211	$50,172
Sewerage	3,276	87,082	44,371
Bridges	3,118	113,124	64,149
Highways	27,188	385,337	292,831
Earthwork, Waterways	14,979	245,134	104,820
Buildings, Public	14,495	432,401	210,204
Industrial	26,517	400,831	338,678
Commercial	71,330	799,355	758,065
Unclassified	3,277	181,562	293,400

NOTE: Minimum size projects included are: Waterworks and waterway projects, $28,000; other public works, $50,000; industrial buildings, $68,000; other buildings, $250,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1948 (22 wks.)	Cumulative 1947 (22 wks.)
NON-FEDERAL	$1,548,522	$691,568
Corporate Securities	848,019	243,729
State and Municipal	700,503	447,839
Total Capital	**$1,548,522**	**$691,568**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	May '48	447.86	215.27
Building Cost	May '48	333.93	180.51
Volume	April '48	302	132

EDITORIALS

VOLUME 140 NUMBER 22

May 27, 1948

More Light on Costs

IN THE SPECIAL SECTION of this issue devoted to construction costs, readers will find much of value. They would find much more, and would benefit proportionately, if cost data were not almost as hard to come by as information on the atomic bomb. This is not an editorial or publishing problem, but a construction-industry problem. And it is one whose lack of solution has done much to slow construction progress. For some reason, inadequate knowledge of construction costs is never attacked as are the shortcomings of technical information. Engineers make available for use and discussion their experiences with a new bridge design or a method of sewage treatment. Contractors describe in detail how they built a new form or operated their excavating equipment. In this they are sometimes merely motivated by pride, but most often they are impelled by a professional responsibility in sharing their information. They feel, and rightly so, that what "secrets" they give away will be compensation for what they learn in return. It is quite different with costs. Everyone wants cost data, but too few are willing to provide them. Until the same kind of professional responsibility rules in the realm of construction costs as is common with technical data, economy in construction will be just that much harder to achieve. In the meantime, those who do make cost data available deserve a very special vote of thanks. They are discharging a responsibility that too many others shirk or fail to appreciate.

Sulphur Joint Compound Research

IF EVER THE NEED for a comprehensive research program was demonstrated it was evidenced in the discussion of sulphur-joint behavior at the recent meeting of the American Water Works Association (*ENR* May 20, vol. p. 742). Shrouded in mystery are the reasons why this widely used material suffers disintegration in certain areas, and is believed to be associated with pitting of cast-iron pipe spigots and the cracking of bell-ends. Reports from users indicate no consistency of probable causes that might be related to soil conditions, presence of sulphur bacteria, galvanic action or other contributing factors, such as vibration, improper installation methods or variations in the compounding of the material itself. The result has been to pile confusion on confusion. One city already has taken the stand that the material shall be banned from use. Another waterworks utility finds no cause for alarm although it acknowledges "some failures". And a big private company operating in several states finds from experience that sulphur compounds should be used on a "selective basis" in certain localities. This hardly reveals a satisfactory situation from the viewpoint of either the users or makers of these compounds. Certainly the tools of research are available, and personnel is not lacking, for application to a program of investigation. What is needed is leadership. It would seem that responsibility for such leadership must rest heavily on the manufacturers of the product.

A Different Breed

FACTORY MANAGERS often complain that their workers do not operate their machines fast enough. Machine-tool builders, too, feel let down that the capacity that they have made available through new designs is seldom utilized. Not so the manufacturers of construction equipment. Their principal problem is designing machines rugged enough to stand the gaff of wide-open throttles, for the construction worker knows of no other manner of operation. His best efforts seem directed toward wearing his machine out as quickly as possible in the interests of the job. Tractors, trucks, concrete mixers, road graders, scrapers, bulldozers, hoists, all set his blood to racing, his fingers itching "to see what she'll do".

Wherein rests this difference in temperments? Being outdoors instead of within building walls may have some influence. Lesser regimentation of work requirements may be another. Labor union restrictions may not have caught up with the average construction worker as they have with the factory hand. Indeed, the fact that the unionized building trades no longer measure up to other construction workers in productivity lends credence to this possibility. More than likely, however, heavy construction attracts a different breed, one that still gets a thrill out of accomplishment and a satisfaction in making new records. It is the breed that has made America great. One of the great

responsibilities of both management and labor leadership is to see that it doesn't die out.

Information on Radioactive Wastes

WHAT steps are being taken to safeguard public water supplies from contamination by radioactive and toxic wastes from atomic energy plants? To this serious question, Arthur Gorman, sanitary engineer of the Atomic Energy Commission was only able to say: "You will be most favorably impressed when the facts are known". Made to the annual meeting of the American Water Works Association, this reply can hardly be satisfactory to any group charged with public health responsibilities, unless it is possessed of unbounded faith.

It is highly debatable that the sanitary engineering profession, and others in the field of public-health, should be asked to rely on faith instead of facts concerning radioactive waste hazards. Until a few weeks ago, (*ENR* April 22, vol. p. 593), when another scientist from the AEC outlined radioactive waste problems before a safety organization—and with more latitude than was apparently permitted to Mr. Gorman—virtually nothing had been made public relating to this matter. Actually, disposal of radioactive wastes and the possibilities of contamination of both watercourses and the atmosphere constitutes one of the gravest problems associated with atomic energy development.

The secrecy surrounding this matter has been interpreted by the Atomic Energy Commission as one aspect of national security policy. But are the best interests of national security being served? It would not appear so when the best answer reported thus far for the disposal of toxic wastes is to concentrate them and use the liquid for making concrete blocks to be deposited out of reach in the deepest parts of the ocean. Neither does it seem to be in the best interests of national security to leave in ignorance those who must deal with the treatment and distribution of water supplies. Safeguards cannot be invoked until the nature and scope of the hazards are known. Except for the recent meagre disclosures that public-health hazards from radioactive wastes do exist, nothing has been done to enlist the interests and talents of many who have a substantial stake in the application of safeguards.

Mr. Gorman's assurance that a program of extensive research is to be initiated by the AEC is a token of desirable progress. And the sanitary engineering profession, of which Mr. Gorman is a distinguished member, finds hope that it will not only be encouraged to contribute its resources, but also enjoy a measure of confidence heretofore lacking on the part of the AEC. With the jeopardy of the public in the balance, so far as radioactive wastes are concerned, it would seem that national security policies require broader definition than has been the case thus far.

The TVA Steam Plant

NONE but the most extreme opponents of the Tennessee Valley Authority should get much satisfaction out of refusal of the House of Representatives to provide $4,000,000 for start of work on an additional steam power station for the TVA. Nor does one have to be an advocate of public power development to see the lack of sound common sense in that action. An earlier Congress set up the TVA and authorized it to build both hydro and steam plants; and since then the nation has invested millions of dollars in building the TVA power system.

Few, if any, of the power systems in this country that depend on water as their principal source of energy can operate at maximum efficiency without steam stations to carry part of the load. This is due chiefly to the wide variation in flow in most of our rivers or to the necessity for operating hydro stations on some closely prescribed schedule because of daily flow conditions.

The Tennessee River system is no exception. If the engineers of the TVA find that the TVA system can be operated more efficiently with another steam station which can be integrated with the hydro stations, Congress should respect their judgment.

The original TVA act authorized the building of steam power stations. The TVA has already built one, and it bought eleven others. This thirteenth steam station would not alter TVA's character nor extend its scope. On the record, it should be approved for construction.

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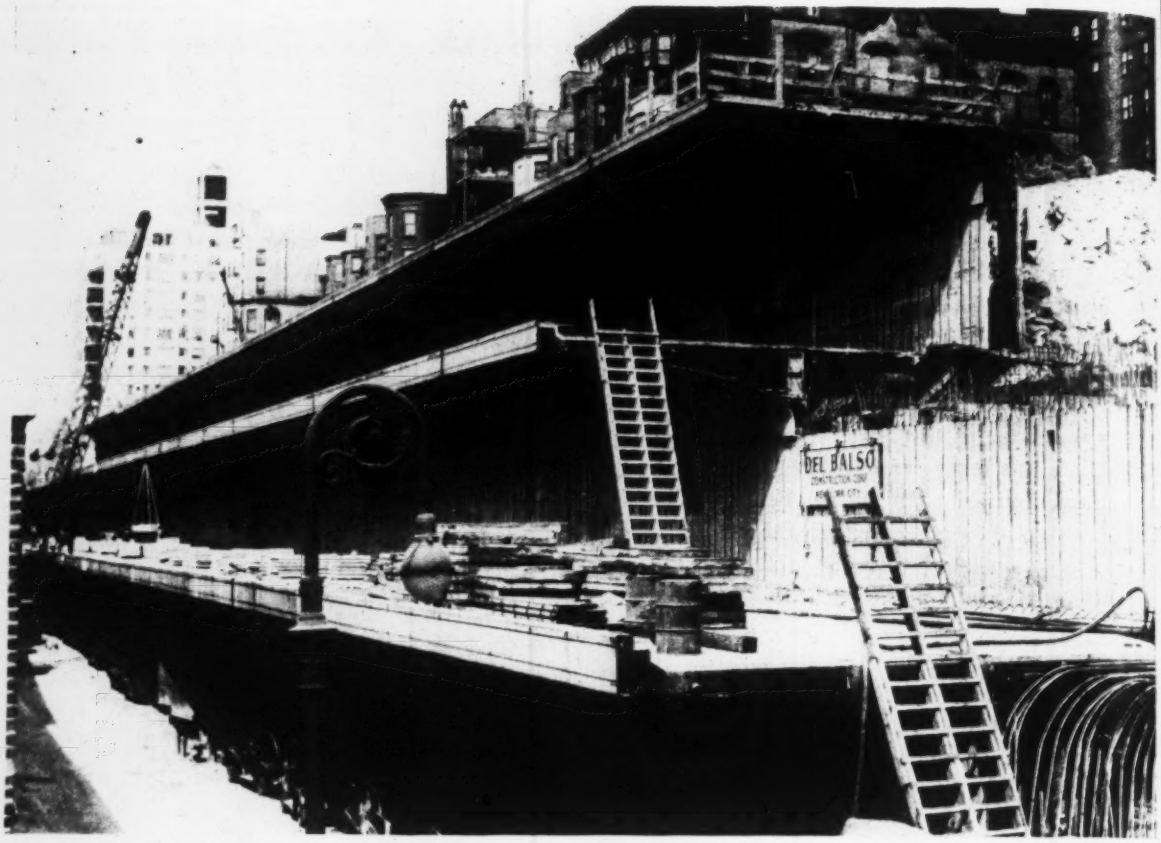


CANTILEVERS at two levels will carry the Brooklyn-Queens Connecting Highway.

New York Builds an Expressway on Shelves

AN UNUSUAL three-level cantilever structure will carry the Brooklyn-Queens Connecting Highway in New York City through a narrow way between Brooklyn water-front structures and the bluff of Columbia Heights without interfering with access to the docks or harming the high-class residential area above.

The existing low street will be maintained full width and the new expressway, with three lanes for traffic in each direction and a promenade, will be carried on three levels of a structure built into the hillside. Successive levels are set back to provide maximum light and air, but less than 50 ft. additional width is used. Extraordinary problems of both design and construction had to be solved.

The 10.5 mi. Brooklyn-Queens Connecting Highway, of which the three-level structure is a half-mile section, is classed as an expressway since it carries all kinds of traffic rather than just passenger vehicles as is required on the city and state parkways. It is primarily a traffic-relieving facility for everyday use, and is the first such expressway without lights or crossings at grade built in New York City.

Route of the expressway

Connecting with Gowanus Parkway at the Brooklyn-Battery tunnel plaza, the expressway skirts the business and commercial areas of Brooklyn, passes the Navy Yard, crosses Newton Creek on Kosciusko Bridge and connects with Grand Central Parkway near LaGuardia Field and Triborough Bridge.

In the Brooklyn Heights section, three-story dock buildings along the waterfront are separated by 50-ft. wide Furman St., from a bluff rising very steeply for a height of some 60 ft. In the past, warehouses and a few other buildings were built on the bluff side of the street. The structures had their rear walls and roofs arched to support a hill at the rear and an earth fill on top. Where possible, the old rear arches have been left in place to help retain the embankment and to support the structures on Columbia Heights during construction. Some structures on the upper level have had to be demolished and others underpinned.

Three lanes of traffic are carried on separate 33.5-ft. roadways. The lower cantilever or south-bound expressway extends 15 ft. 7 in. over Furman St., with the rest built back over earthfill area. The second cantilever, for north-bound expressway traffic, extends 20 ft. 4 in. over the lower roadway. The third cantilever, the pedestrian promenade, has its entire width of 23 ft. 7 in. extending over the north-bound roadway.

The structure is designed as a rein-

forced concrete rigid frame supported on pile footings. But, since the structure deviates so much from conventional shape, it should be explained that the rigid frame encompasses only that part of the bottom deck from the rear row of piles to the front wall as its horizontal member, with the front wall serving as its vertical member. Thus, it is a one-hipped frame. The horizontal component of the frame thrust is included in the horizontal loads taken by the rows of piles under the front footing.

In the super-imposed part of the structure above the bottom deck, it will be noted that in the two-level structure a counterforted wall is used to support the second level, while in the three-level structure, a double wall with diaphragms between is used to support the second level because of the possibility of reversal of moment, depending on the location of live loads on the second and third levels. The wall supporting the pedestrian cantilever is itself a cantilever, designed to resist the stresses of both the pedestrian walkway and the earth pressure.

***THE REASON** for the unusual structure is quickly apparent from this view of the crowded section and steep terrain through which the new expressway must pass to carry traffic from the Brooklyn-Battery Tunnel (now under construction) to La-Guardia Airport and outlying sections of the borough of Queens.*

Design loadings

Roadway loading is H20-S16, a truck and trailer combination with two 16-ton axle loads 14 ft. apart. Thirty percent impact was added.

The cantilever part of the second deck can carry two of the three lanes of traffic of the northbound roadway and the cantilever part of the first deck can carry one and one-half of the southbound roadway lanes. If two trucks should operate side-by-side on the second deck cantilever, the loads would be distributed back to the springing line over widening, overlapping triangular areas. The outside wheel load is distributed along 14 ft. at the springing line, the next along 12.7 ft., the next along 9.5 ft., and the one next to the springing line along 4.7 ft. This conforms to the AASHO distribution formula.

Vibrations of the cantilevers were considered in their design, and conservative sections were used to keep the concrete stress under 650 psi., instead of the 1,000 psi. usually allowable for this class of concrete. The mass of the structure will provide a damping effect and will reduce any tendency of the vibrations to amplify in resonance. The cantilever supporting the pedestrian promenade is designed for a live load of 100 psf.

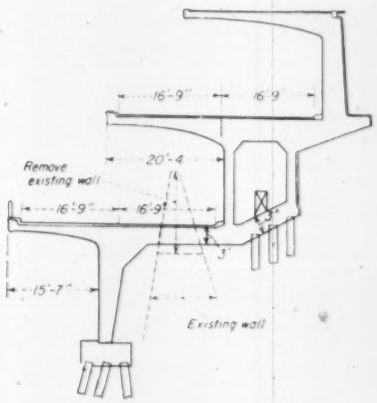
Earth pressure design was based on Rankine's formula, using 30 pcf. (lb. per cu. ft.) as the equivalent fluid pressure. However, as the structure steps back against the hillside, each successive horizontal deck partially protects the wall in front from earth pressure above. This is evident when it is seen that each set back of the structure takes the place of a large rectangular portion of the potential sliding wedge of earth, and hence, eliminates that much of the load.

The most satisfactory way of evaluating the effective earth pressure on this shape of structure was found to be the Culmann graphical method of analysis. The weight of earth was assumed to be 100 pcf.

Sound deadening provisions

The undersides of the cantilevers, although appearing parabolic, are actually quadrants of ellipses so designed as to prevent the sound of highway traffic from being focused against the dock structures on Furman St., and reflected back and upward to become a continual nuisance to the residents on Columbia Heights.

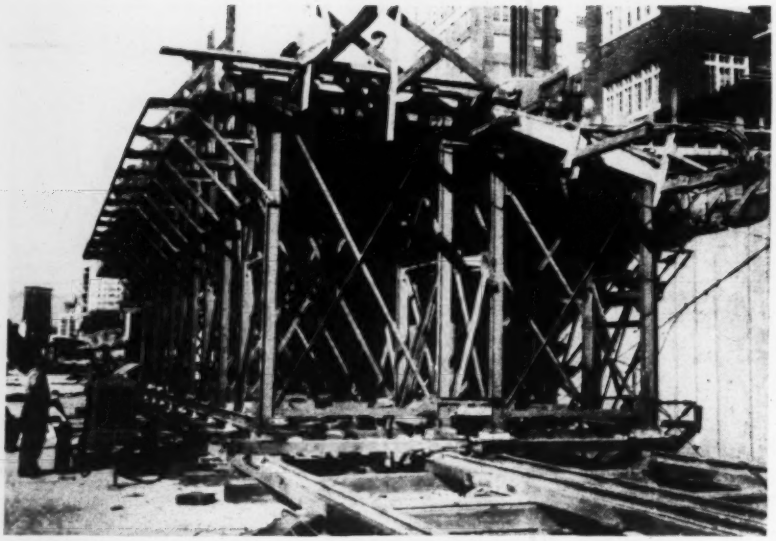
Walls of the structure along the roadways will be faced with granite veneer. Illumination is provided from lights set in the concrete soffit.

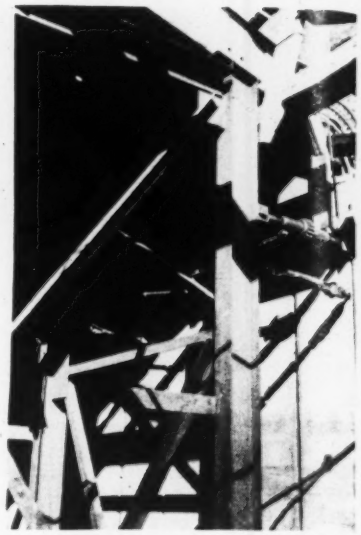


***USE OF CANTILEVERS** at three levels makes possible provision of two three-lane roadways and a wide promenade over an area as wide as one roadway.*

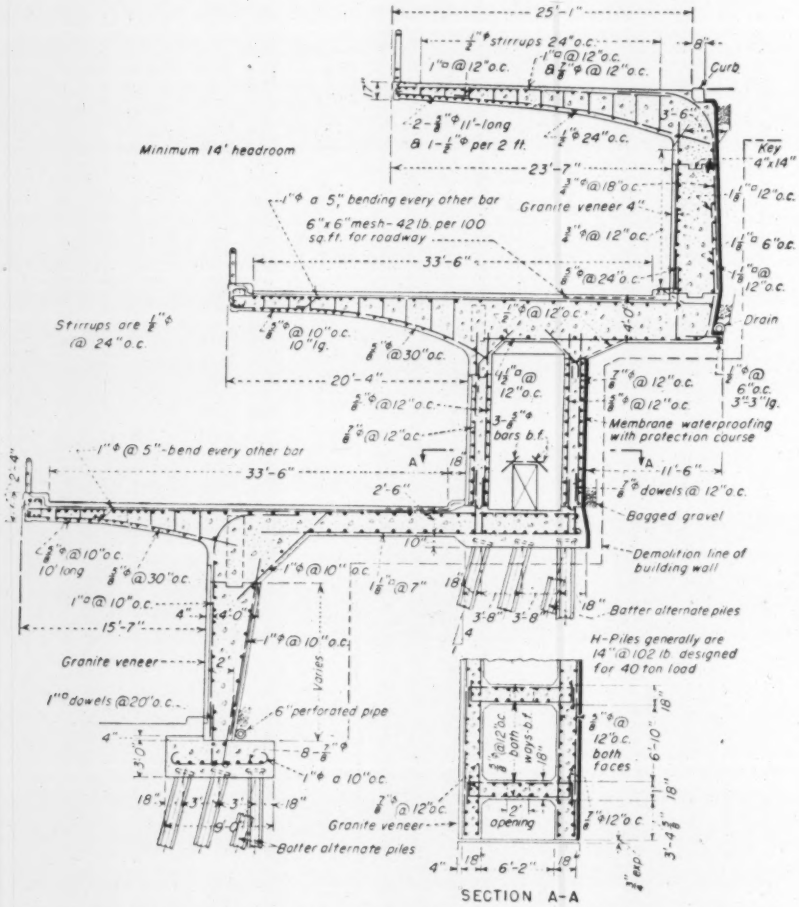
The ground in the area is of somewhat mixed character and piles were used at the two points of support to eliminate any uneven settlement. Every phase of construction had to be carefully handled to prevent movement of buildings, some of them quite large, on the heights above. Most of the old buildings are on spread footings—one of the heaviest loads was found to be supported quite near an old open excavation.

Procedure for construction was to start at the lower street level and work up, thus assuring adequate stability for the existing buildings as well as the new structure.





FORMWORK for the 20-ft. 7-in. cantilever of the second deck was of steel. At the right is a detail of the form for a 4-in. set-out of concrete above the granite-face area. Turnbuckles hold the form in position while the push-pull jack forces a hinged section of skin-plate against the wall.



THE THREE-LEVEL SECTION of the structure carries roadways at the two lower levels and a promenade for local residents on the top. South-bound traffic will use the lower roadway and north-bound traffic will move on the second level.

Vibration from early driving caused some earth movement near existing large structures on the heights, occasioned by buildings not being founded according to recorded plan and by driving conditions more difficult than could be anticipated from borings, which did not disclose old vaults and masonry obstructions. Original plans called for cast-in-place concrete piles, but conditions encountered made it expedient to change to steel H-piles. Most of these are 14-in., 102-lb. sections designed to carry 40-ton loads. Piles on the lower level are 25 to 30 ft. long, while those some 20 ft. higher on the hillside are about 35 ft.

Data obtained from frequent load tests on driven piles were used to control the lengths and driving of successive piles. As a result the number of blows per foot required to drive the piles to develop their designed bearing values was substantially less than indicated by pile driving formula. This reduction driving minimized vibration.

Following driving of piles at the lower level, the footing and wall were constructed and backfilled to prevent movement of the earth as piles are driven at the higher level in the sloping hillside.

As part of a rigid frame, it is essential that the main reinforcing all be in place in full-length bars, when the concrete is placed. To drive the piles

at the lower level over these bars a special driver was rigged to ride on a gantry frame on rails at the Furman St. level and on a single rail at the higher level, bridging the reinforcing. The three-drum hoist for the pile driver was located on the rig, with steam supplied from a boiler skidded separately along the street.

Walls for the structure are formed with movable wood panels. No special care is required as the exposed face of the wall is covered with 4 in. of granite veneer and originally is left rough, with frequent vertical reglets for attaching the stone.

The cantilever section of the roadway is formed by specially built traveling units that move on rails on the roadway below. The section back of the wall is placed on compacted backfill.

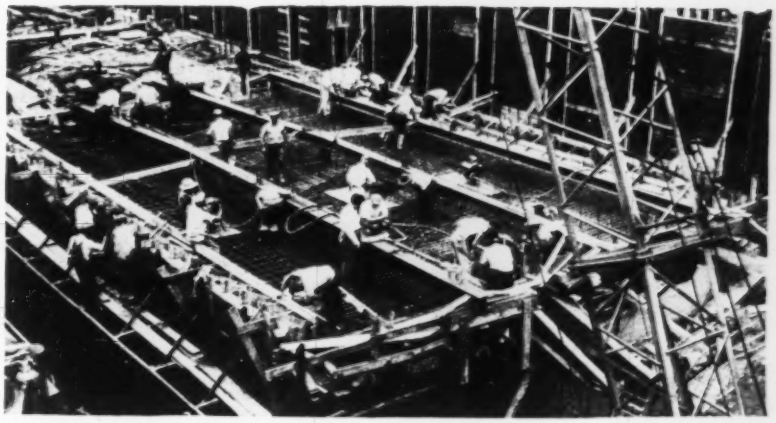
Different widths and shape of cantilever made three sets of forms necessary. The units are of steel, and are 60 ft. long to match specified expansion joints. Jacks lift the forms from the rails to exact position where they are blocked and then tied to the wall by coarse-threaded anchors set when the wall is concreted.

The deck pour is detailed to start just above the granite facing. Provision is made for stepping the concrete out 4 in. and starting the steel form with a hinged plate held against the wall by push-pull jacks.

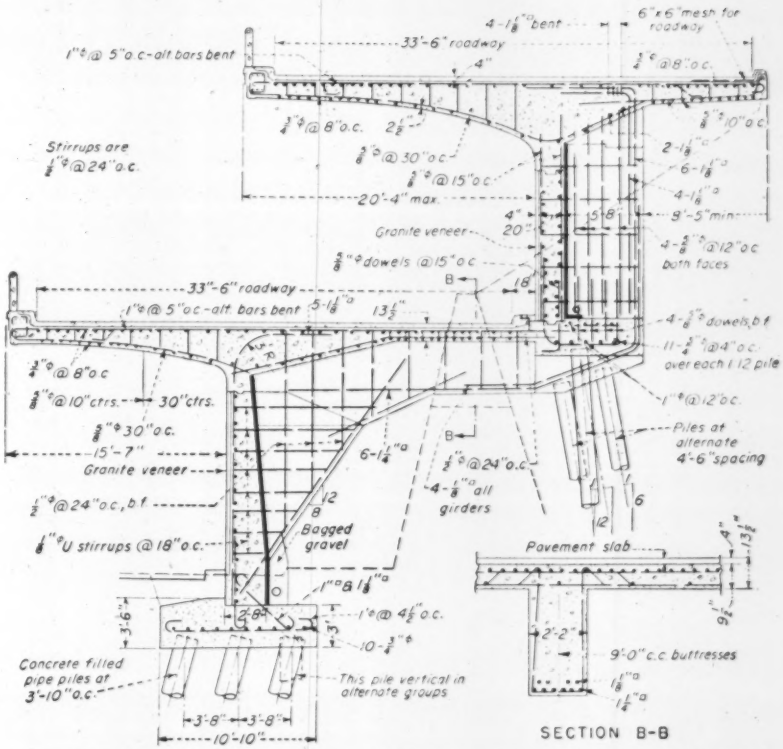
The form for the lower level, with a 15 ft. 7 in. width was built in one unit while the other two were constructed in two longitudinal sections that could be moved separately. However, it was found that the entire form, to a 23 ft. 7 in. width, could readily be handled as a unit.

The form surface is a ¼-in. plate supported by 3x4x¼-in. angles spanning 5 ft. and at spacing varying according to the load. Following ship design practice, the edge of the 4-in. leg of the angle is welded to the plate, forming in effect a 4-in. channel with a 3-in. flange. The supporting frame is rigidly braced to take the eccentric load of uneven concrete depth.

The exact position of reinforcing is important in the rigid frame and cantilever structure. Heavy beams and angles are used to support the steel. To avoid disfiguring the underside of the cantilever slab, considerable money has been spent in placing steel angle hangers to carry the lower steel from the rods above rather than supporting it on conventional small concrete blocks resting on the form.



REINFORCING *is accurately positioned and held in position rigidly, to get full design strength from the steel.*



A TWO-LEVEL SECTION *carrying no pedestrian walkway is used where possible.*

Concrete of 3,000 psi. strength is purchased commercially and comes to the job in transit-mix trucks. In most cases it is placed directly by crane and bucket and then is vibrated to assure high consolidation and good surfaces. The riding surface is a 4-in., mesh-reinforced concrete slab, placed later.

The section of the Brooklyn-Queens Connecting Highway in Brooklyn is being constructed by the Bureau of Highways and Sewers of the Office of the President of the Borough of Brooklyn. This 4½ mile length of the highway, including the three-level section described, is being designed and its construction supervised by Andrews & Clark, consulting engineers. The three-level section, and other work in the Columbia Heights area, is being constructed by Del Balso Construction Corp., under a $5,836,000 contract.

All photos courtesy Ric-Wil Co., Cleveland, Ohio.

City Steam Line Tunneled Beneath • • •

• • • Heavily Traveled Six-Lane Street

George W. Hamlin
Commissioner, Division of Water and Heat
Cleveland, Ohio

WHEN Cleveland, Ohio, faced the necessity of installing a 6-in. steam conduit under one of its heavily-travelled six-lane traffic arteries (Carnegie Ave. at East 105th St.), it chose the tunnel-jacking method. Open trenching was out of the question, as heavy traffic requirements precluded closing any of the traffic lanes during construction. Moreover, existing underground facilities left only an 8-ft. free working depth below street surface.

Some idea of the need for maintaining uninterrupted street traffic during installation of the steam line may be gained from the fact that a traffic survey made in June of 1944 showed Carnegie Ave. carrying 28,000 cars and busses daily at the construction site. Today, the traffic is considerably greater than it was in 1944.

Installation of the steam line, measuring less than 100 ft. between manholes on either side of Carnegie Ave., was part of an extension of the city's central heating system which has been supplying street steam to the Euclid Ave.-East 105th St. and the Carnegie Ave. areas since 1912. Buildings to be served by the new installation are located directly across Carnegie Ave. from an existing steam main.

The tunnel had to be amply reinforced to prevent cave-ins during construction as well as after the new steam line was cut into service.

The procedure adopted for installation of the heating line, as well as the materials and equipment utilized in its construction are interesting and worth consideration by other engineers and construction men who are faced with similar situations.

Heavy impact from traffic

A 6½x15-ft access pit was excavated at the curb line on the southeast corner of the intersection of Carnegie Ave. and East 105th St., from which a 30-in. dia. tunnel was projected 82-ft. due north to a manhole directly across the street. No. 8-gage spiral-welded iron casings were selected for tunnel construction after it was proved that the 10-ft. lengths were fully capable of sustaining the continuous impact imposed by the extremely heavy traffic loads overhead, even with but 5 ft. of cover. To insure against injury to the galvanized coating of the tunnel casings as they were pushed through the horizontal excavation, a metal jacket was lap-welded around exterior corrugated surfaces.

Geared tracks used

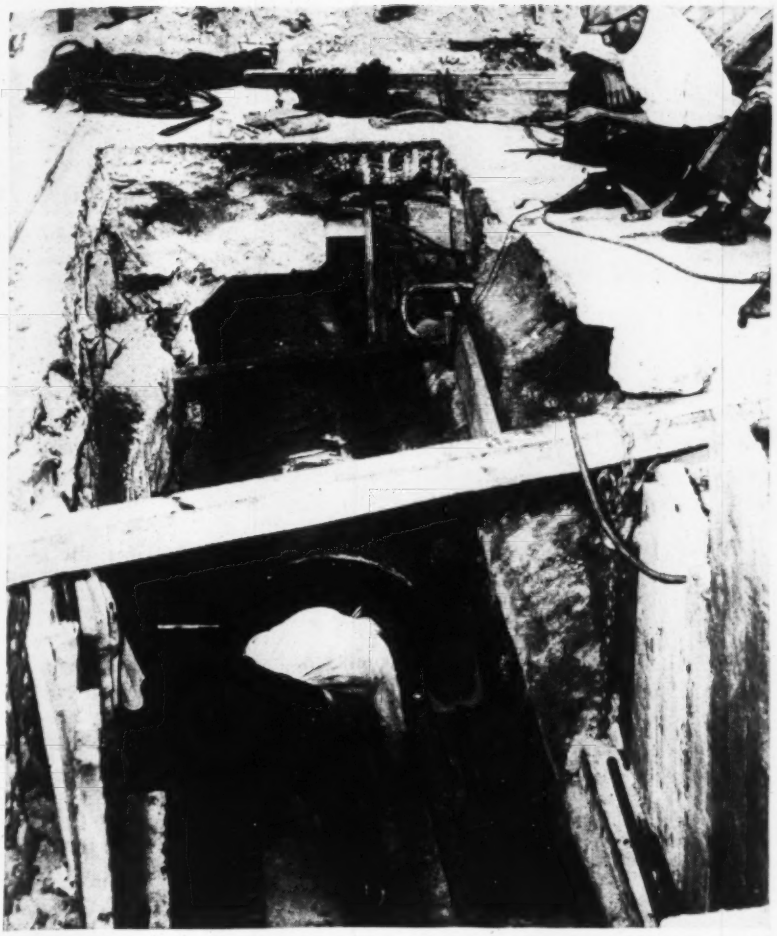
Special geared tracks facilitated pushing the tunnel casing into the horizontal excavation as digging progressed. The track was anchored on the floor of the open pit, at the correct slope and alignment to serve as a guide for projecting the casing. The casing rested on the inner edges of the rails, which were spaced the maximum distance apart that would permit clearance between top of tie and lowest point of the casing.

The casing was pushed forward by two 75-ton hydraulic jacks bearing against an 8x8-in. timber, set horizontally across the end of the casing at an elevation about one third of its height. The jack reaction was taken by notches cut into the rails at regular intervals.

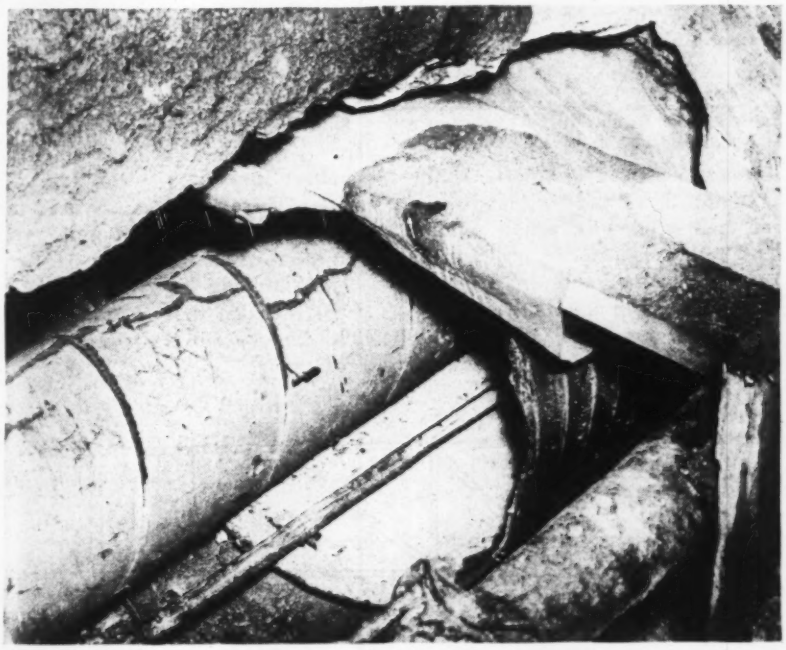
Since the tunnel was only 2½ ft. in diameter, only one man at a time could work in the tunnel, excavating at the heading with power spade and hand shovel. The others operated a towline that pulled a small handcar loaded with excavated material to the workshaft, where the spoil was shoveled into a truck and hauled to a disposal area.

When a 10-ft. length of tunnel casing had been completely driven in, a new section was lowered and coupled to casing already in the tunnel, bonded by a special bolted coupling. After the street crossing was completed, the bottom of tunnel casing was paved with concrete to assist the jacking operations required to install the steam conduit.

To add further flexibility to the design as well as for maximum strength, insulation and protection of the underground steam line, special insulated pipe units were selected for installation in the completed tunnel. These units, entirely



SPECIAL geared track, anchored in the work shaft, facilitated pushing the 30-in. tunnel casing underneath the street, as excavating progressed at the heading.



INVERTof tunnel casing was paved with concrete to prevent damage to insulated steam conduit while jacking it into place.

factory prefabricated in convenient 21-ft. lengths—including pipe and insulation, thoroughly protected with 16-gage corrugated iron housing—were easily and quickly telescoped into the tunnel, and steam service connections were made with a substantial saving in construction time.

Completion of the project required a total of three 24-hr. working days, resulting in an installation cost considerably less than if the city had followed the customary practice of opening this busy street, installing piping and replacing the pavement.

Steam supplied by pumping plant

It is interesting to note that the central heating service for the Euclid Ave.-East 105th St. area originates from the remote Fairmount Municipal Pumping Station.

The general practice of municipal water pumping stations throughout the country is to waste exhaust or excess steam after process and plant heating requirements have been satisfied. But the Fairmount Station, by control of this excess steam, supplemented by some live steam, has been able to provide a useful and revenue-producing commodity for sale to an adjacent (Cleveland's second largest) commercial community.

The Fairmount Station serves 131 customers with 237,000,000 lb. of steam annually, and much of the credit for absence of smoke in this area can be attributed to the street steam system. Other central heating plants include the Kirtland Municipal Water Pumping Station on Cleveland's lakefront, where steam is purchased at the boiler plant headers to supply eight large East Side industrial plants; the Shaker Management Company which serves a model community with approximately 140,000,000 lb. of street steam annually; and the Cleveland Electric Illuminating Co., a private utility supplying steam heating facilities to better than 90 percent of downtown Cleveland. These, together with many other types of central heating systems, are doing a splendid job in Cleveland's uphill fight for smoke abatement.

The general plan of jacking the casing beneath the street originated with J. J. Antweiler, engineer of distribution, Division of Water. R. M. Mumma, assistant engineer for the city, handled details of construction.

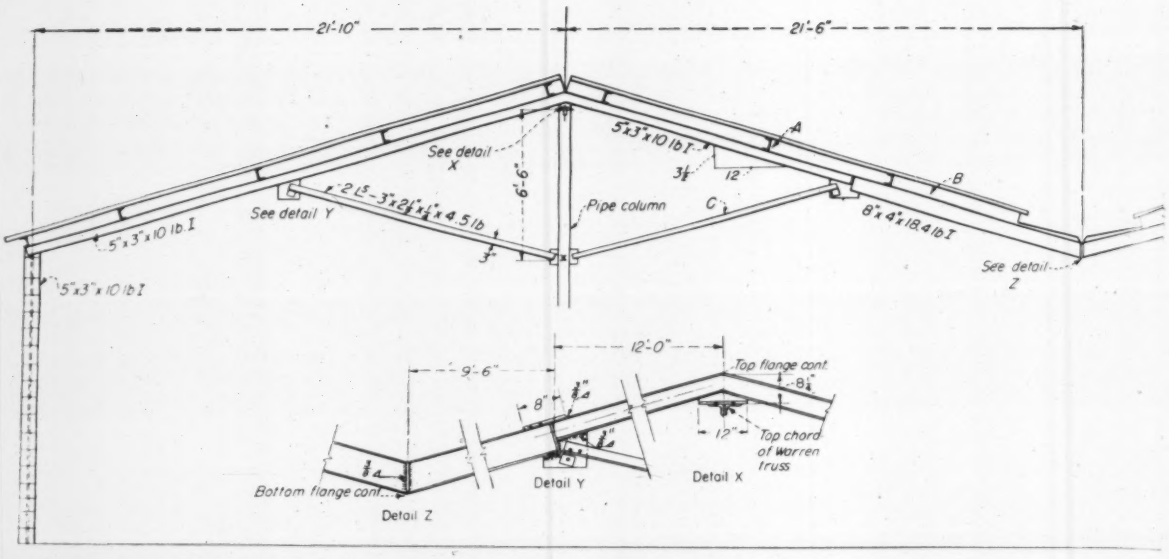


Fig. 1. Spanning 43 ft., the umbrella truss is composed of I-beam rafters (A and B) and a knee brace C.

"Umbrella Trusses" Form Low-Weight Roof

STRUCTURAL STEEL for the roof of a New Orleans factory weighs only 5 psf. as compared with 7 to 10 psf. ordinarily used. The low weight, attributed to the use of V-trusses composed of steel I-beams, enabled the cost of constructing the building to be kept down to $3.42 per sq.ft.

Named "umbrella trusses" by the designer, William H. Creighton, these trusses consist of three members: An inverted V (shown as A in Fig. 1) with the crotch straddling a supporting Warren truss; a V suspended from the ends of A (shown as B in Fig. 1); and a strut extending from the lower chord of the Warren truss to the juncture of A and B. These struts reduce the unsupported span of the truss from 43 to 19 ft.

Member A is a 5x3-in. by 10-lb. I, and B is an 8x4-in. by 18.4-lb. I. The struts consist of two 3x2½x¼-in. angles, with long legs back to back. At the junction of A, B and C, plates were bolted or welded to the upper and lower flanges of A and B to develop a negative moment (Fig. 1). This connection was an important factor in limiting the size of B. Application has been made for a patent on the truss.

Part of the 150x259-ft. one-story building in which the V-trusses are used is a warehouse for cotton bales. The remainder, 150x170 ft., is utilized for offices and for manufacturing and processing cotton batting. The two areas are separated by a concrete-block firewall, which extends through the roof along the centerline of a trough of a gutter (Fig. 3).

Exterior walls are also of 8-in. concrete block, almost windowless. Daylight is let into the warehouse area through skylights in the plane of the roof with a glass area 20½x60 in. The skylights are spaced 16 ft. 8 in. apart in rows, and the rows are 21 ft. 6 in. apart. With a sky brightness of 1,000 ft.-candles, producing 150 candle power per sq. ft. at inside surface of the glass, light intensity in warehouse is 7 to 8 ft.-candles.

Under similar conditions, the corrugated wire-glass skylights over the manufacturing area yield 28 ft.-candles. These skylights are 5x12 ft. and are placed 33 ft. c. to c. in rows, with the rows 21 ft. 6 in. apart.

The building is ventilated by means of ridge roof ventilators and 4x9-ft. intake louvers spaced 21 ft.

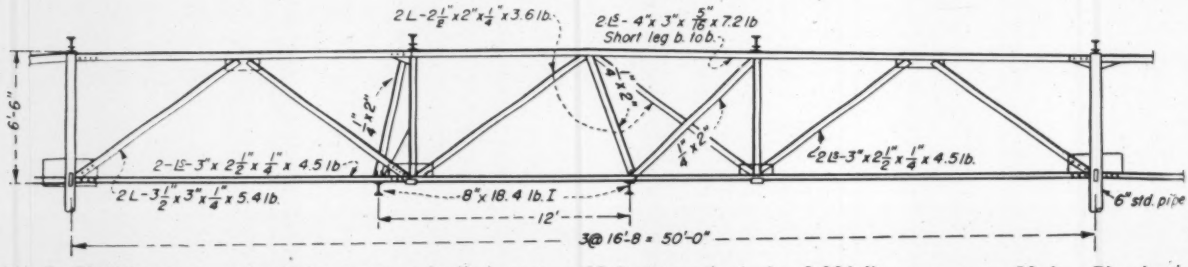


Fig. 2. The Warren trusses, which support umbrella trusses at 17-ft. intervals, and a 3,000-lb. crane, span 50 ft. The depth is about the rise of the rafters.

6 in. apart at floor level around the exterior walls. Provision has been made to close the louvers with sheet metal in winter.

Bays are 43x50 ft.

The building exterior follows the V-shape contour of the roof, with the concrete block extending to the underside of the roofing (Fig. 3). There are six 43-ft. wide bays, each having equal-length slopes of 3½ on 12.

Under the peaks are the Warren trusses (Fig. 2). Supported on 6-in. dia. standard steel pipe columns, 50 ft. apart, these trusses extend the width of the building. Upper and lower chords are 6 ft. 6 in. apart so that the clearance under the lower chords is the same as that under the adjacent roof valleys. Clearance under the center trusses is 14 ft. to allow room for replacement of machine rollers. The two end trusses, however, slope 2 ft. in 50 to reduce the height of the front and rear walls and incidentally to provide a slope for drainage.

The Warren trusses carry the umbrella trusses, which are spaced 17 ft. apart, and a pair of rails for a 3,000-lb. crane.

The umbrella trusses were designed to support roof sheeting (5 psf. of roof area); corrugated glass skylights (9 psf. of glass area); a sprinkler system (0.5 psf. of horizontal projection); a ventilator (200 lb.); purlins; a gutter consisting of corrugated sheeting (5 psf.), vermiculite (2-in. average thickness), built-up roofing (6 psf.) and water (1-in. average depth over gutter); their own weight; and a live load of 20 psf. of horizontal projection. Since, for the most part, the live load was due to wind, allowable stresses were increased 33 percent.

Fig. 3. Concrete-block exterior walls extend to the roof of the factory-warehouse, and daylight is admitted through skylights in the plane of the roof.

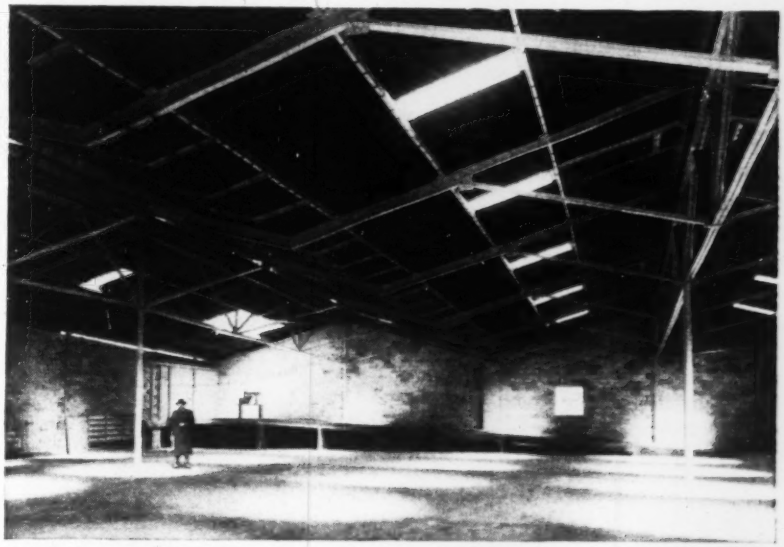


Fig. 4. Knee braces cut to 19 ft. the unsupported span of the umbrella trusses, which support 7-in. channel purlins and 24-gage protected-metal roofing.

SUMMARY OF STRUCTURAL STEEL

		Total Pounds	Pounds per Sq.Ft.
Trusses (Warren)	18—50 ft. x 6 ft. 6 in.	34,726	0.894
Columns	12—5-in. Std. Pipe	4,182	0.108
Columns	12—6-in. Std. Pipe	5,823	0.150
Columns	20—5-in. I 10 lb.	3,105	0.080
Rafters-Lower	40—8-in. I 18.4 lb.	16,181	0.416
Rafters-Lower	20—5-in. I 10 lb.	2,406	0.062
Rafters-Upper	80—5-in. I 10 lb.	22,357	0.576
Knee Braces	120—2-Ang. 3 x 2½ x ¼	15,803	0.408
Purlins	450—7-in. 9.8 lb.	74,866	1.928*
Gutter Angles		3,678	0.095
Wind Bracing		3,035	0.078
Sag Rods		377	0.010
Essential Steel		**186,539**	**4.805**
Supplementary Steel			
Crane Rail & Supports		9,969	0.257
Door Framing		5,003	0.129
Skylight Framing		1,348	0.035
Ventilator Framing		6,760	0.174*
Total Steel		**209,619**	**5.400**

* Open to further economies.

The structural steel used in this building is summarized in the accompanying table.

Architects were Freret and Wolf of New Orleans, La. Perrilliat-Rickey Construction Co. erected the 38,800-sq. ft. building under a $133,000 contract, excluding sprinklers.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Diversion Factors for Sewers

Sir: The critical comments on diversion factors for combined sewers (*ENR* Mar. 18, 1948, vol. p. 418 and Nov. 27, 1947, vol. p. 734) prompts us to draw attention to a different approach.

In Jan. 1947, the Interstate Sanitation Commission began preliminary studies to arrive at a more rational means of determining the size of intercepting sewers on combined systems.

Initial study of diversion factors led to the suggestion that an interceptor should be designed to accommodate a dry-weather flow plus an amount of storm-water run-off from rains of pre-determined frequencies or in pre-determined quantities. Preliminary investigations for this purpose have been carried out and a beginning has been made on development of time-intensity curves of rainfall occurring at high intensity and at high frequency.

SETH G. HESS
Director & Chief Engineer
Interstate Sanitation Commission
New York, N. Y.

X-Raying Welds

Sir: We enjoyed your editorial on "Inspection of Structural Welds" (*ENR* April 15, 1948, vol. p. 548). Knowledge and experience in radiographic weld inspection in no way distorts the opinion expressed in this editorial. Radiographic tests will result in very accurate conclusions, if interpreted by competent X-ray engineers and not weld engineers. The high subject contrast of varying thicknesses and angularities of welds in a structural joint present no difficulties to Gamma radiography. Any experienced weld inspector can give plenty of reasons why he questions the structural adequacy of work performed by welders qualified under the present obsolete A.W.S., A.S.M.E. and other codes.

The cost of using Gamma-radiography is not at all prohibitive. The lack of confidence by reviewing officials in welded construction is quite justified by past experience, and trust in welded construction can be established only if the reluctance of the code committees of the various societies can be overcome and better and more progressive welding and qualification codes are drawn up.

W. W. OFFNER
X-Ray Engineering Co.
San Francisco, Calif.

Housing at Los Alamos

Sir: In your article entitled "Behind Our Atomic Iron Curtain Big Scale Construction Goes On" by Robert Colborn, (*ENR* April 15, 1948, vol. p. 550) it is stated on p. 553 that "quite a few houses collapsed the first time it snowed", and in the next paragraph it is stated that "construction work is being done by Robert E. McKee Construction Co."

This is to advise that there has never been an occasion of any collapse of any house we have ever built at Los Alamos, or any place else, and we think that this erroneous statement should be corrected immediately, as it not only reflects upon the reputation of Mr. McKee, but also W. C. Kruger, the architect, and on the officials of the Atomic Energy Commission at Los Alamos, who supervised the construction.

J. R. BRENNAND
General Manager
Robert E. McKee, General Contractor
Los Alamos, N. M.

EDITOR'S NOTE: Concerning the above criticism of his statement, Mr. Colborn says: "Collapse is too strong a word to describe the construction difficulties which occurred. It should not have been used—and would not have been if the phrase in question had been intended to do more than emphasize the commendable speed with which community building designed to re-establish morale at Los Alamos is being pushed.

"According to my information, a substantial number of houses and one of the community buildings suffered extensive damage to roofs and ceilings when a snowfall unusually heavy for the region occurred shortly after completion of construction. In this connection it should be pointed out that clearance of the article by The Atomic Energy Commission related only to questions of security. AEC takes no responsibility for factual correctness".

Engineers as Ambassadors

Sir: The account of the spring meeting of the American Society of Civil Engineers at Pittsburgh (*ENR* April 15, 1948 vol. p. 543) lists the delegates from the United States for several international engineering conferences to be held this summer in Europe. The profession should be very pleased to have so many engineers going abroad this year, as technically trained people are good ambassadors, although they may not feel that way.

For the past three years the writer has lived in the Washington D. C. area and has had the privilege of meeting numerous foreign engineers, technical specialists and government representatives sent to this country to secure various types of equipment and services. Repeatedly these visitors point out that they find American engineers especially pleasant to deal with because these men are accustomed to discussing facts and talking about specific things, rather than using a language that sounds good but permits, in final analysis, little interchange of actual information. They further report that American engineers working in their countries make the best impression of any group of United States citizens abroad. This condition occurs because engineers from the States are usually well informed, appreciate the past engineering and professional accomplishments of the older countries and are accustomed to seeing the other fellow's viewpoint.

As they attend the numerous international conventions this summer, American engineers will be privileged to meet many people understanding and appreciating the type of information they will bring with them.

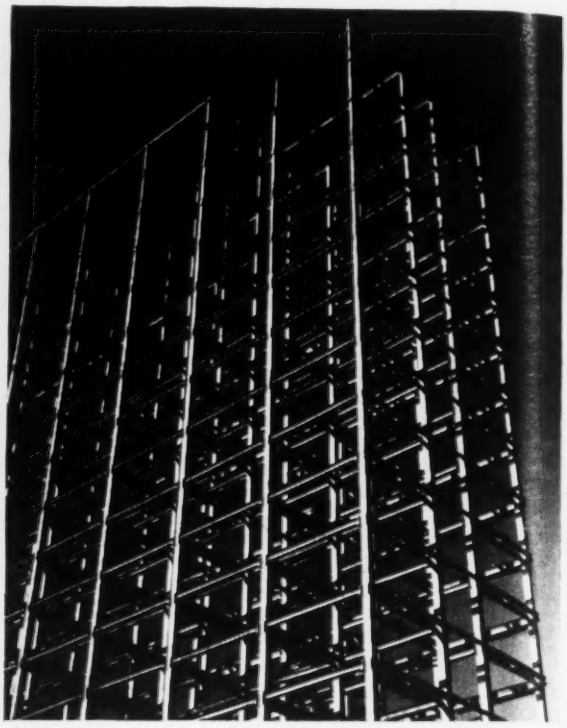
A. N. CARTER
Manager, Highway Division
The Associated General Contractors of America

ENGINEERING NEWS-RECORD

CONSTRUCTION COSTS

1948 Edition

Design of a Skyscraper Hospital 88
Freight Elevator Costs 93
Sewage Treatment Costs up 40 Percent 96
Construction Cost-Control Simplified 98
Cost Trends for Low-Rent Projects 100
Construction Productivity Rising 102
Highlights of Construction Costs—1948 107
Construction and Building Cost Indexes 108-121
ENR Construction and Building Cost Index ..... 108, Insert, 109, 111
ENR Construction Volume Index 111
Installed Equipment Costs Index 121
Prices of Construction Materials 123-131
Construction Wage Rates 133-145
Canadian and Australian Wage Rates 145
Cost of Financing 147
Roadbuilding Costs 149, 153
Base Rates on Compensation Insurance 155, 157
Construction Equipment Rental Rates 161
Index of Construction Machinery Prices 162
Depreciation Schedule—U. S. Bureau of Internal Revenue 167, 169
Index of Small House Cost 171, 173
Unit Prices, Index 175



Skidmore, Owings & Merrill (Hornbeck) photos

Fig. 1. Steel for the Ft. Hamilton Veterans Hospital in Brooklyn was completely erected before the floors were placed. The 17-story hospital wing is connected through an elevator core to a 5-story medical-services wing.

Design of a Skyscraper Hospital

TO MAKE THE MOST of a site on the south shore of Brooklyn and provide the facilities necessary for an efficient 1,000-bed general medical hospital, the Ft. Hamilton Veterans Hospital was built with two long, narrow parallel wings, connected at the center by a 17-story section. One wing houses medical services and the out-patient department within its five stories. The second, planned to give nearly all the bedrooms a southern exposure, contains the nursing units and is 17 stories high. Because of the shape of this high wing, wind stresses were an important consideration in the design of the steel frame.

In addition to the hospital, a one-story, steel-frame service building containing a laundry, garage and power plant is being built under the present contract.

The project is being constructed on an 18-acre site adjacent to the Ft. Hamilton army reservation and overlooking The Narrows (separating upper and lower New York Bay) on the south. To take advantage of this water view, as well as to give as many of the rooms as possible a southern exposure, almost all the beds were located on the south side of a long, narrow wing with an east-west axis. This wing is 216 ft. high, 489 ft. long and 46 ft. wide. It is connected at the middle through the lower portion of a 17-story-and-penthouse section containing the main elevators to the 55x 369-ft., 5-story north wing (Fig. 1).

Examination of the soil at the site revealed sand and silt near the surface, groundwater at basement floor level and good sand about 10 to 15 ft. below basement level. Therefore, it was decided to rest the building on 30-ton friction piles.

Treatment of the exterior

The hospital has 4-in. brick exterior walls, with 8-in. concrete block backup; a structural steel frame; two-way ribbed, reinforced concrete floors with 6-in. thick concrete filler blocks; and hung ceilings (Fig. 3). In the design of the floors, live load was taken as 40 psf. in wards, 60 psf. in corridors and 100 psf. in lobbies. Ribs are 4 in. thick and 20 in. c. to c. each way.

On the south elevation, the concrete floor slabs are cantilevered 3 ft. 9 in. from the face of the wall to form a canopy over each continuous line of windows. The bottoms of the canopies are set flush with the hung ceilings, which are sometimes as much as 3 ft. below the floor. Hence, anchorage of the cantilever reinforcement had to be secured by passing the negative steel through holes in the spandrel beams and then bending and extending the bars into the floor slab (Fig. 3). The canopies have one expansion joint in every bay.

The steel frame has no expansion joints despite the great length of the main wing. However, joints were provided between the main building and adjacent structures, such as the reinforced-concrete ramp leading to the first-floor entrance.

Built on both a horizontal and vertical curve, this ramp makes possible a two-level entry on the north side of the building for separation of patients and visitors. The former enter on the ground floor, and the latter use the ramp, which provides a 20-ft. roadway and a 6-ft. sidewalk supported on single reinforced concrete columns, 6 ft. wide and 2 ft. thick.

Simple wind connections sought

In general, the hospital was designed in accordance with the New York City building code, except that a steel unit stress of 20,000 psi. was used. In the 17-story south wing, columns are spaced 20 ft. 4 in. apart longitudinally and 16 ft. 6 in. c. to c. transversely, providing a central corridor of 8-ft. clear width between the interior columns (Fig. 4). Because of the height-width ratio of the wing, wind in the transverse direction was an important factor in the design of the steel frame.

Double-channels serve as transverse floor beams, selected principally for the simplicity of the wind connections at the columns (Fig. 6). Generally 12 or 13 in. deep, these channels are spaced 16 in. apart, one on each side of a column, and the webs are connected by angles to the flanges of the columns.

Throughout most of the wing, the channel pairs are continuous past the interior columns and are spliced at the center of the corridor. Near both ends of the wing, however, ventilating ducts that carry fresh air taken in at the end walls necessitated the use of shallower beams in the corridor. Hence, simple-beam spans were used at the wing ends, with 6-in. WF 15.5-lb. beams spanning the corridor width. In the longitudinal direction, 12-in. WF beams are generally used. The floor system was designed to transmit the wind stresses to the columns, assuming no assistance from the elevator core.

Because of the cold weather encountered, the steel frame was completely erected before the floors were placed (Fig. 1). This expedited construction by eliminating the interference and consequent delays that usually arise in the simultaneous execution of steel erection and concrete sub-contracts.

In the selection of materials for interior finish, sanitation and maintenance were major considerations. Extensive use is made of glazed structural tile for interior walls. Structural glass is used in the operating rooms, and the elevator core is faced with porcelain-enamel steel panels on the lower levels.

Floors in corridors and wards are surfaced with asphalt tile and acid-resisting asphalt tile is used in laboratories. The main lobby has a terrazzo finish, and the lounges and recreation halls are topped with cork. Ceilings are mainly of plaster, but in certain areas acoustic finish is used.

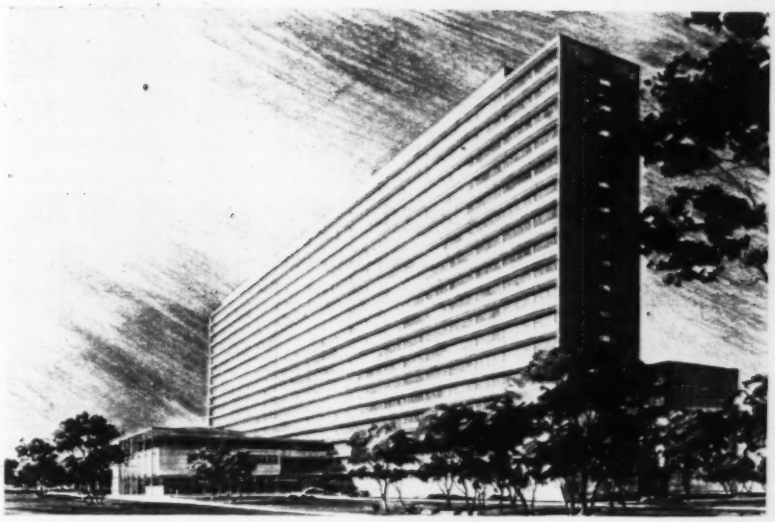


Fig. 2. Architect's rendering of the south elevation of the hospital wing. The theater wing on the south was eliminated when the plans were modified last year.

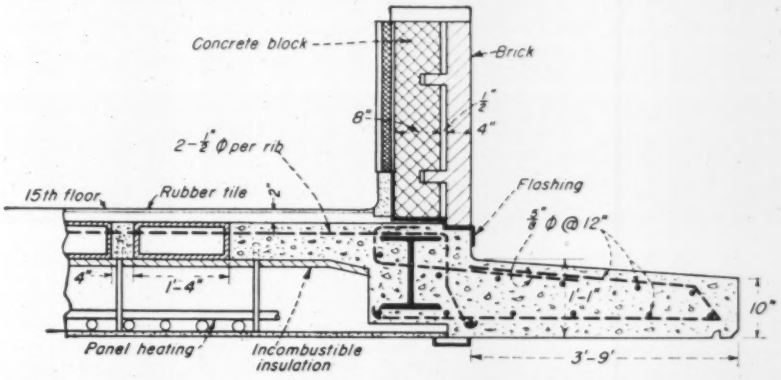


Fig. 3. Section through the south wall of a psychiatric unit, showing the concrete canopy, panel heating and floor and wall construction.

Design based on VA criteria

The Ft. Hamilton hospital was one of the first designed under the revised criteria of the Veterans Administration. Promulgated in 1946, these criteria take into account the fact that, on the average, patients stay longer in veterans hospitals than in civilian hospitals (*ENR* Nov. 14, 1946, vol. p. 662). Thus, veterans hospitals require additional facilities, principally for recreation and rehabilitation. Rising construction costs, however, made necessary in 1947 a revision of the criteria to conserve space, and the Ft. Hamilton project was modified accordingly, the recreational facilities being eliminated or condensed.

The hospital contains ample facilities for general medical treatment, with most of the services concentrated in the five-story north wing. In the basement of this wing are located an orthopedic brace shop, clinical illustration laboratory and morgue. On the ground floor are a receiving unit, an emergency and admitting depart-

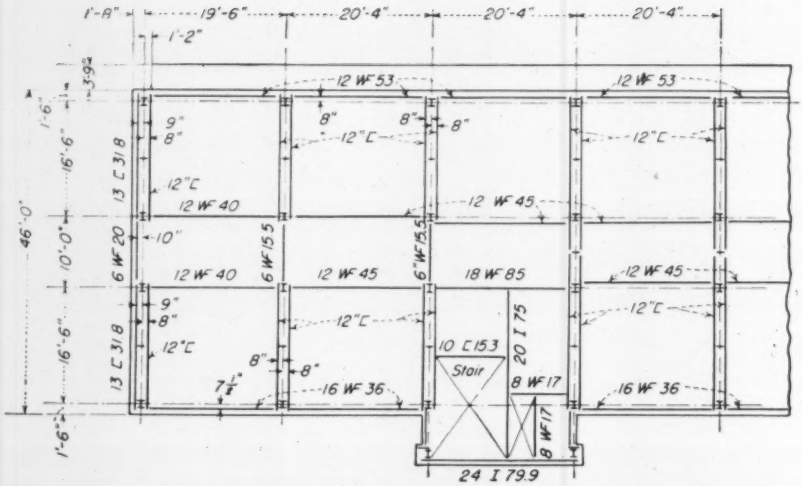


Fig. 4. Part framing plan of the end of a floor in the upper part of the south wing. The double-channel floor beams are continuous past the columns except near the ends of the wings, where ducts interfere.

ment, and an out-patient section. The floors above contain, respectively, a dental unit and facilities for social and volunteer services; occupational and physical therapy departments; X-ray radiographic and therapy sections, as well as various laboratories; and an operating suite. Two elevators are available for out-patient use.

The center section of the hospital houses the principal means of vertical transportation. It is equipped with five standard hospital-size public elevators and four service elevators, two of which are of normal size—5 ft. 4 in. wide—and the others 7 ft. wide, to facilitate the handling of food carts. In addition, this core contains a central supply area in the basement, a pharmacy on the ground floor, a public lobby on the first floor, a medical education section on the second floor, staff quarters and animal rooms on the third floor and a surgical recovery unit on the fourth floor. A visitors lobby, a service kitchen, storage areas, offices and conference rooms are located on the upper floors. The penthouse contains mechanical equipment.

40-bed ward forms nursing unit

In the south wing, central stores and mechanical equipment are located in the basement. Lockers, subsistence storage and refrigeration rooms are on the ground floor; administration and recreation areas on the first floor; a recreation hall, food service station and some interne quarters on the second floor; interne and staff quarters and an isolation unit on the third floor; and a women's unit and surgical nursing unit on the fourth floor. On the fifth floor and above are placed the nursing units, with the 13th and 14th floors occupied by neurological nursing units and the 15th and 16th floors by psychiatric units (quiet and disturbed).

With the exception of the disturbed psychiatric unit, which has only one 40-bed section per floor, each level above the fifth contains two nursing units of 40 beds each, symmetrically placed about the center of the wing (Fig. 5). Each unit includes 12 single-bed rooms, three 4-bed rooms and one 16-bed room, a solarium, patients bath and nurses station. From the fifth to the twelfth floors, 38 of the 40 beds are in rooms with southern exposure.

The psychiatric units have projecting-type windows equipped with interior security screens. Other nursing units have double-hung window installations.

On the north side of the north wing, fixed double-glazed windows are used in the air-conditioned operating rooms and casement windows with fixed and movable sash elsewhere. Incandescent fixtures are generally used for artificial lighting.

Space heating is accomplished by means of radiators and convectors under the control of outside thermostats. An exception occurs in the psychiatric units, where radiant heating systems are located in the ceilings to prevent patients from injuring themselves on the heating elements and from tampering with the mechanical equipment.

The operating suites and recovery, allergy and animal rooms are air conditioned. Also, the air supply for these and some other areas will be passed through electrostatic filters and batteries of germicidal lamps.

Steam is generated in the service-

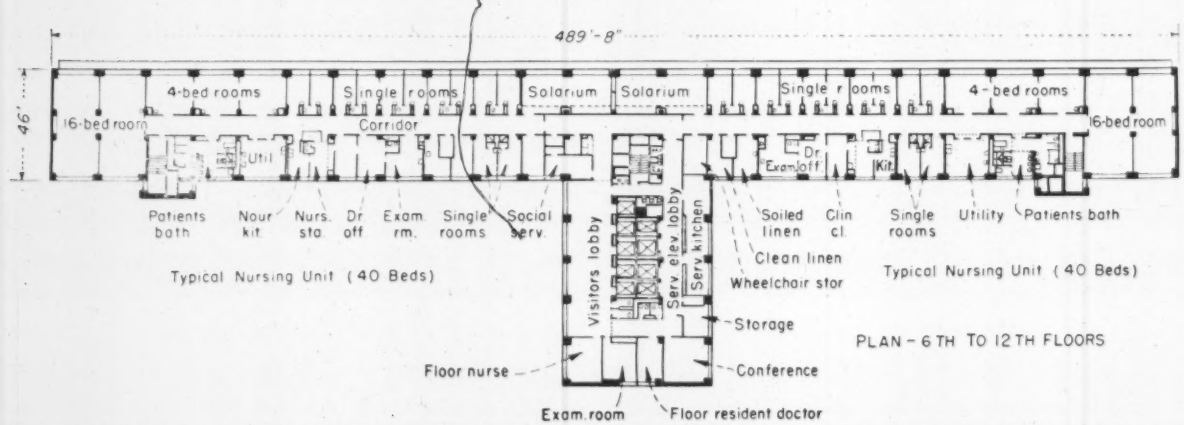


Fig. 5. Floor plan for the sixth to twelfth floors. Of the 40 beds in each nursing unit, 38 are in rooms with southern exposure.

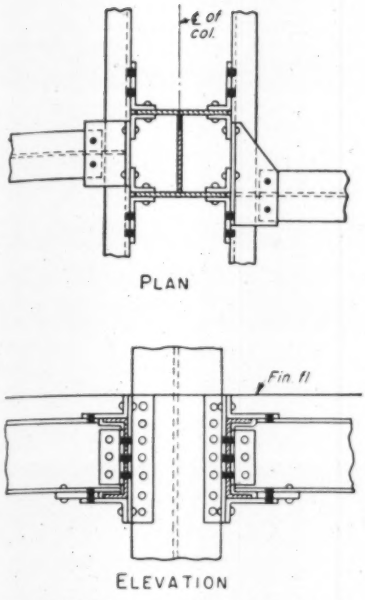


Fig. 6. Wind connection at an interior column for double-channel beams.

building power plant for use in space heating, hot-water heating, sterilizing, food service and laundry equipment and is brought through a tunnel to the basement of the south wing. To obtain economical distribution, the main steam risers, as well as most of the vertical ducts, are located in the elevator core, and horizontal distribution is through the spaces between ceilings and floor slabs.

Designers and builders

Architects for the Ft. Hamilton Veterans Hospital were Skidmore, Owings & Merrill, with Gordon Bunshaft in charge of the design. Structural design was by Weiskopf & Pickworth, and Jaros, Baum & Bolles were the mechanical engineers. Cauldwell-Wingate Construction Co. holds a $14,700,000 general contract. Under separate contract, Bethlehem Steel Co. fabricated and erected the 6,000 tons of structural steel for $1,100,000, and Stock Construction Company drove the piles and placed the pile caps for $426,600, with Raymond Concrete Pile Co. as subcontractor.

The design criteria were developed under the direction of F. H. Dryden, assistant administrator for construction, real estate and supply of the Veterans Administration, and J. J. Rockefeller, director of construction. Planning and construction is under the supervision of the U. S. Army Engineers under the general direction of Lieut. Gen. R. A. Wheeler, Chief of Engineers, and Brig. Gen. John S. Bragdon, chief of military construction for the Corps. Col. Charles S. Williams is district engineer and J. A. Rooney is chief, Military Construction Division, of the New York district. Maxwell H. Gray is project engineer for the Corps of Engineers and William Powers, general superintendent of construction for the contractor.

Unit Prices—Ft. Hamilton Hospital

For payment purposes only

Item	Quantity	Unit Price
SITE IMPROVEMENTS		
REMOV. EXIST. STRUCT	lump sum	$7,500.00
GENL. SITE GRADING		
Excavation	lump sum	9,000.00
Fill	lump sum	11,000.00
GENL. SITE DRAINAGE		
Excavation	2,000 cy	4.84
Catch Basin	22 ea	331.00
Pipe 8 to 10 in.	1,810 lf	1.94
Pipe 1 to 6 in.	670 lf	1.81
LANDSCAPING	lump sum	37,538.00
FENCING	lump sum	5,500.00
OPEN WALKS & TRAILS	lump sum	22,270.00
OUTDOOR RECREA. FAC.	lump sum	21,810.00
OUTSIDE UTILITIES		
STORM SEWERS		
Manholes	17 ea	520.00
Pipe		
Sizes 21-30 in.	1,510 lf	6.20
Sizes 12-18 in.	1,655 lf	4.80
Excavation	6,400 cy	4.80
Dry Wells	8 ea	260.00
ROAD EXCAV.	lump sum	7,215.00
ROAD BASE COURSE & SURFACE	lump sum	47,500.00
RDWY. BRIDGES, OVERPASSES & UNDERPASSES		
Ramp	320 lf	200.00
Tunnels	370 lf	150.00
Entrance Bridge	34 lf	300.00
PARKING AREAS	lump sum	24,345.00
SEWAGE COL. & DISP.		
Excavation	2,850 cy	4.70
Manholes	7 ea	450.00
Piping		
Sizes 15-18 in.	620 lf	15.10
Sizes 8-10 in.	230 lf	6.20
Sizes 4-6 in.	675 lf	2.40
WATER SUPPLY ST. & DISTR. SYSTEM		
Excavation (General)	4,040 cy	4.60
6 in. Pipe	940 lf	7.30
8 in. Pipe	2,270 lf	7.60
Fire Hydrants	10 ea	260.00
Water Meters	4 ea	1,950.00
Water Meter Pits	2 ea	2,750.00
POWER & LIGHT DISTR.		
Manholes	4 ea	200.00
Duct Lines	2,250 lf	1.20
Cable & Equipment	3,300 lf	1.40
Street Lighting System		
Standards	35 ea	215.00
Cables	6,100 lf	.80
Regulators & Control Equip	lump sum	1,200.00
HEATING SYSTEM EXTERIOR		
Equipment (Exp. Joints)	9 ea	260.00
Distr. Lines in Tunnels & Trenches	1,980 lf	4.90
Manholes	4 ea	130.00
Covering	lump sum	2,914.00
Trenches	lump sum	26,036.00
FUEL OIL STORAGE		
Piles	40 ea	61.40
Excavation General	3,500 cy	1.50
Hand Excavation	100 cy	4.00
Forms	3,600 sf	.90
Concrete	160 cy	30.00
Reinforcing Steel	5 ton	320.00
Backfill	2,500 cy	.80
Waterproofing	lump sum	800.00
Storage Tanks & Appurtenances	lump sum	35,454.00
OUTSIDE GAS		
Pipe	450 lf	6.60
Excavation	240 cy	4.29
GAS & OIL STORAGE	lump sum	6,000.00
TELEPHONE & FIRE ALARM SYSTEM	lump sum	2,275.00
MAIN HOSPITAL BUILDING		
FOUNDATION & SUBSTRUCTURE EXCAVATION		
Excavation	295 cy	6.00
Backfill	10,940 cy	1.25
Grade for Slab	5,018 sy	.60
Porous Fill	760 cy	6.75
Pumping	lump sum	19,000.00
Footings & Found. Walls		
Forms	91,000 sf	.65
Concrete		
Walls & Floor	2,720 cy	33.60
Grouting Billets	lump sum	5,000.00
Rubbed	18,000 sf	.25

Item	Quantity	Unit Price
Steps, 100 lf	lump sum	957.00
Reinforcing		
Bars	70 ton	320.00
Mesh	47,000 sf	.13
Waterproofing & Dampproofing		
Membrane Waterproofing	109,000 sf	.15
Hydrolithic W. P.	lump sum	373,850.00
BUILDING ENCLOSURE		
Miscellaneous Metals & Trim	lump sum	375,000.00
Reinforced Concrete		
Forms	663,000 sf	.70
Concrete		
Arches & Fireproofing	13,050 cy	32.00
Slag Blocks	266,000 ea	.85
Retarding Treatment	3,000 sf	.08
Reinforcing		
Bars	690 ton	336.00
Clips	84,300 ea	.13
Masonry Walls & Backup		
Facing		
Limestone	2,000 cf	10.00
Face Brick	71,000 cf	7.20
Ext. T. C. Tile	6,430 sf	2.50
Backup		
Common Brick	24,340 cf	2.90
Cinder Block	100,999 cf	1.20
Fire Brick	600 cf	6.65
Partition Walls		
Hollow Tile		
6-in. Hollow Tile	87,470 sf	.74
4-in. Hollow Tile	198,870 sf	.51
3-in. Hollow Tile	510,000 sf	.50
2-in. Hollow Tile	78,555 sf	.55
Metal Partitions	lump sum	40,100.00
Exterior Doors	lump sum	30,000.00
Exterior Windows & Glass		
Windows		
Double Hung	76,718 sf	3.78
Casement Type	22,157 sf	3.11
Special (FE, M & E Type)	3,470 sf	6.08
Glass & Glazing		
Standard	35,065 sf	1.10
Plate	52,295 sf	1.70
Thermopane	3,500 sf	8.77
Wire	3,200 sf	2.76
Screens		
Insect Doors & Screens	lump sum	27,670.00
Detention Screens	lump sum	54,440.00
Roof Garden	lump sum	4,640.00
Louvres	lump sum	4,950.00
Roofing	466 sq	50.00
Weather Protection		
Caulking	lump sum	9,000.00
Flashing	16,190 lf	.80
Spandrel Flashing	80,400 sf	.37
INTERIOR FINISH		
Finished Wall & Ceiling		
Metal Furring & Lathing	lump sum	292,400.00
Plastering		
Plastering Walls H.W.	79,200 sy	2.80
Plastering Walls K.C.	14,000 sy	3.31
Plastering Walls Cement	18,000 sy	1.09
Plastering Ceilings H. W.	32,500 sy	3.40
Plastering Ceilings K. C.	4,000 sy	3.91
Plastering Ceilings Cmt	450 sy	3.20
Movable Partitions	lump sum	2,200.00
Acoustical Treatment & Insul.		
Acoustical Treatment		
Acoustical Plaster Walls	30 sy	4.80
Acoustical Plaster Ceilings	27,100 sy	5.00
Insulation	lump sum	89,450.00
Interior Doors & Windows	lump sum	466,350.00
Interior Stone Tile & Terrazzo		
Interior Tile		
Ceramic Tile Floor	51,800 sf	1.39
Ceramic Tile Base	23,800 lf	1.43
Ceramic Tile Wall	120,705 sf	1.85
Ceramic Tile Ceiling	2,000 sf	2.08
Brick Floor Tile	9,400 sf	1.25
Quarry Tile Floor	11,800 sf	1.25
Terrazzo		
Terrazzo Floor	20,750 sf	1.11
Terrazzo—Metal Strips	6,810 sf	1.35

INTERIOR FINISH (continued)

Item	Quantity	Unit Price
Terrazzo Core Base	60,516 lf	1 41
Precast Terrazzo	316 lf	1 41
Structural Glass	220 sf	5 00
Utility Block		
Utility Block	112,300 sf	1 40
Utility Block Base	3,950 lf	1 40
Glazed Block		
Clear Glazed Wall	68,850 sf	1 50
Clear Glazed Base	10,000 lf	1.50
Colored Glazed Wall	96,000 sf	1 65
Colored Glazed Base	15,000 lf	1 65
Architectural Terra-Cotta	8,000 sf	3 20
Marble & Slate	lump sum	91,625.00
Floor Topping & Covering		
Asphalt Tile		
Asphalt Tile Floor	351,655 sf	.21
Acid Resist. Asph. Tile Fl	900 sf	.27
Asphalt Block	3,110 sf	.92
Cork Tile		
Cork Floor	9,520 sf	.83
Cmt. Floors & Surf. Tr.	lump sum	247,956.00
Wood Flooring	lump sum	2,900.00
Carpentry — Finish — Wood Work		
Carpentry	lump sum	43,000.00
Rough Hardware	lump sum	35,000.00
Finish Wood Work	lump sum	88,000.00
Painting	lump sum	208,000.00
COMPLETE PLUMBING TO A POINT 5 FT. OUTSIDE B.L.		
Water System		
Piping		
Sizes 3-8 in.	4,074 lf	22.80
Sizes 1¼-2½ in.	26,189 lf	4.10
Sizes ½-1 in.	41,619 lf	2.70
Water Pumps & Tanks		
House Pumps	3 ea	5,250.00
Booster Pumps	4 ea	875.00
Hot Water Circulating Pump	3 ea	650.00
House Tanks	3 ea	18,300.00
Fixtures & Installation		
Hosp. Type Fixt. & Bath Tubs	440 ea	250.00
Domestic Type Fixtures	1,490 ea	71.60
Fixtures Fur. by others	280 ea	22.50
Accessories	1,109 ea	6.20
Drinking Water Machines	2 ea	4,720.00
Specialties		
Pressure Reducing Valves	1,135 ea	42.40
Trim for H.W. Generators	3 sets	535.00
Thermostatic Mixing Valves	20 ea	155.00
Sprinkler System		
Piping	2,114 lf	3.80
Valves, Gauges & Specials	7 sets	825.00
Medicine Cabinets & Mirrors		
Medicine Cabinets	200 ea	40.00
Mirrors	lump sum	15,000.00
Gas, Air & Other Special Systems		
Compressed Air System	1,772 lf	2.50
Air Compressors	2 ea	2,250.00
Gas Piping	2,330 lf	2.00
Other Special Systems		
Suction System	3,694 lf	7.60
Suction Machines	2 ea	400.00
Fire Standpipe System		
Piping	4,364 lf	8.50
Hose Outfits	116 ea	395.00
Hot Water Generators, 60x 168-2,000 g.p.h.	3 ea	12,900.00
Sewer System		
Piping		
Sizes 8-15 in.	1,303 lf	22.20
Sizes 3-6 in.	25,197 lf	4.40
Sizes 1 ft. 2 in.-2 ft. 2 in.	26,325 lf	3.20
Sewage Ejectors & Grease Traps		
Sewage Ejectors	2 ea	2,625.00
Grease Traps	21 ea	255.00
Sump Pumps	2 ea	475.00
Pipe Covering & Painting	lump sum	82,271.00
HEATING & VENTILATING		
Steam System		
Piping		
Sizes 14-10 in.	935 lf	35.80
Sizes 8 in.	4,086 lf	24.30
Sizes 6-4 in.	10,256 lf	10.00
Sizes 3-2 in.	25,700 lf	4.10
Sizes 1½ in or Less	71,000 lf	1.50
Piping Covering	91,800 lf	1.30
Radiators, Valves & Traps		
Radiators	1,860 ea	53.00
Valves & Traps	1,860 ea	10.70
Radiator Enclosures	980 ea	75.50
Pumps & Tanks for System	10 ea	2,360.00
Temperature Control	lump sum	20,648.00
Unit Heaters & Radiant Heating Coils		
Unit Heaters	58 ea	110.00
Radiant Heating Coils	181 ea	120.00
Air Conditioning Equipment		
Central Air Conditioning	423 ton	220.00
Ductwork (Incl. Registers & Grilles)	150,000 lb	.75
Unit Air Conditioner	3 ea	4,000.00
Chilled & Cond. Water Piping	1,967 lf	17.00
Covering of Duets	lump sum	21,010.00
Covering of Piping	1,940 lf	5.00
Water Pumps	2 ea	1,425.00
Temperature Control	lump sum	14,150.00
Ventilating System		
Fan & Machinery		
Fans	lump sum	32,602.00
Unit Vent & Air Heating Units	lump sum	48,110.00
Filters	12 ea	1,625.00
Registers & Grilles	lump sum	12,707.00
Ductwork		
Straight Ductwork	173,100 lf	.65
Ductwork; Elbows, Fittings, Hangers, Etc.	113,700 lb	.65
Ductwork, Casings, Fin. Conn.	110,200 lb	.65
Covering	lump sum	53,000.00
Temp. Control	lump sum	34,000.00
Heating Coils	lump sum	9,100.00
Refrigeration	lump sum	30,000.00
ELECTRICAL WIRING & FIXTURES		
Lighting Power Wiring		
Wiring	1,070,000 lf	.22
Conduit & Raceways	348,000 lf	1.25
Connecting Equipment	lump sum	10,000.00
Wiring Devices	8,126 ea	2.50
Panels & Switchboards	lump sum	112,850.00
Electrical Switchboards		
Light Fixtures	10,100 ea	20.50
Outlet Boxes	17,100 ea	4.50
Telephone System	lump sum	13,600.00
Annunciator System		
Nurses Call System	lump sum	82,000.00
Paging System	lump sum	32,000.00
Miscellaneous Systems		
Radio & Public Address	lump sum	77,000.00
Fire Alarm	lump sum	43,000.00
Clock System	lump sum	19,000.00
Dumbwaiter Telephone	lump sum	1,000.00
In & Out Register	lump sum	6,215.00
Tele Talk Phones	lump sum	5,000.00
ELEVATORS		
Passenger Elevators		
Elevators P1 through P5	5 ea	67,630.00
Elevator P6	1 ea	29,800.00
Freight Elevators		
Elevators S1 through S4	4 ea	71,910.00
Elevator S5	1 ea	29,750.00
Elevator S6	1 ea	12,700.00
Elevator S7	1 ea	25,400.00
Dumb Waiters		
No. 1 & 2	2 ea	18,420.00
No. 3, 4 & 5	3 ea	16,740.00
EQUIPMENT		
X-Ray Equipment	lump sum	2,500.00
Misc. Lab. Equipment	lump sum	120,000.00
Sterilizers		
Vet. Adm. Symbol VS-1A	1 ea	1,600.00
Vet. Adm. Symbol VS-1B	1 ea	2,000.00
Vet. Adm. Symbol VS-3	28 ea	340.00
Vet. Adm. Symbol VS-6F	1 ea	4,500.00
Vet. Adm. Symbol VS-6G	1 ea	5,000.00
Vet. Adm. Symbol VS-8	2 ea	1,450.00
Vet. Adm. Symbol VS-9C	2 ea	500.00
Vet. Adm. Symbol VS-10	1 ea	300.00
Vet. Adm. Symbol VS-12	40 ea	900.00
Vet. Adm. Symbol VS-14	1 ea	900.00
Vet. Adm. Symbol VS-15	1 ea	400.00
Vet. Adm. Symbol VS-15a	2 ea	400.00
Vet. Adm. Symbol VS-16	8 ea	900.00
Vet. Adm. Symbol VS-19	2 ea	900.00
Vet. Adm. Symbol VS-20a	1 ea	4,500.00
Dental Sterilizer Battery	1 ea	580.00
Misc. Furniture	lump sum	6,500.00
Kitchen & Bakery Equipment	lump sum	203,100.00
Other Equipment		
Incinerator	lump sum	4,230.00
Shades & Blinds	lump sum	22,840.00
Other Items	lump sum	281,830.00
GARAGE, LAUNDRY & BOILER HOUSE		
FOUNDATION & SUB STRUCTURE		
Excavation		
Excavation	15,800 cy	1.50
Backfill	5,800 cy	1.00
Grade for Slab	3,450 cy	.46
Porous Fill	580 cy	6.00
Shoring & Bracing	3,000 sf	2.00
Caissons & Piling	388 ea	61.40
Footings & Foundations		
Forms	46,300 sf	.54
Concrete	1,730 cy	30.00
Reinforcing Steel Bars	57 ton	320.00
Mesh	31,000 sf	.13
Waterproofing	1,200 sf	.20
BUILDING ENCLOSURE		
Misc. Iron & Steel, tons	lump sum	40,000.00
Reinforced Concrete		
Forms	79,700 sf	.54
Concrete		
Arches & Fireproofing	1,150 cy	32.00
Slag Block	31,000 ea	.80
Reinf. Steel Bars	49 ton	320.00
Beam Clips	18,000 lf	.13
Masonry Walls & Backup Facing		
Limestone	lump sum	12,000.00
Face Brick	5,740 cf	.74
Back Up		
Common Brick	1,585 cf	.74
Cinder Block	5,550 cf	.56
Partition Walls	1,270 sf	.52
Exterior Doors	lump sum	1,000.00
Exterior Windows & Glass	lump sum	32,000.00
Roofing	330 sq.	21.00
Weather Protection		
Caulking	lump sum	200.00
Flashing		
Flashing	2,000 lf	.80
Spandrel Flashing	1,940 sf	.40
INTERIOR FINISH		
Finished Walls & Ceilings		
Furring & Lathing	lump sum	5,500.00
Plastering		
Plastering Walls H.W.	203 sy	2.90
Plastering Walls, Cement	300 sy	1.65
Plastering Ceilings H. W.	1,766 sy	4.50
Interior Doors & Windows	lump sum	13,000.00
Interior Stone, Tile, Etc.	lump sum	60,500.00
Floor Topping	lump sum	26,000.00
Carpentry & Finish Woodwork	lump sum	5,540.00
Painting	lump sum	12,000.00
COMPLETE PLUMBING To a pt. 5 ft. Outside B. L.		
Water System		
Piping		
Sizes 3 to 8 in.	725 lf	12.20
Sizes 1¼ to 2½ in.	2,281 lf	3.30
Sizes ½ to 1 in.	1,541 lf	1.44
Water Pumps & Tanks		
Laundry Waste Pumps	2 ea	1,374.00
Hot Water Circulating Pump	1 ea	161.00
Fixtures & Installations	58 ea	82.85
Specialties		
Thermostatic Mixing Valves	10 ea	100.00
Trim for Hot Water Generators	4 ea	274.75
Gas, Air or Other Special Sys.		
Compressed Air System	481 lf	1.65
Air Compressor, Etc.	2 ea	700.00
Hot Water Generators		
Hot Water Generators 5 x 16 ft, 2,000 g.p.h.	3 ea	7,945.33
Heat Reclaimer 4,800 g.p.h.	1 ea	4,190.00
Sewer System		
Piping		
Sizes 8 to 15 in.	458 lf	17.00
Sizes 3 to 6 in.	2,758 lf	4.50
Sizes 1½ to 2½ in.	907 lf	1.80
Sewage Ejectors	2 ea	1,186.00
Pipe Covering & Painting	lump sum	9,805.00
HEATING & VENTILATING		
Steam System		
Piping	13,900 lf	4.75
Pipe Covering	6,500 lf	2.40
Radiators, Valves & Traps	29 ea	67.50
Pumps & Tanks	9 ea	1,446.44
Boilers & Accessories	4 ea	54,053.00
Boilers	4 ea	25,187.00
Boiler Settings	4 ea	10,188.00
Accessories	4 ea	18,678.00
Fuel & Ash Handling Equip.	4 ea	16,591.00
Temp. Control	lump sum	500.00
Unit Heaters	24 ea	116.75
Air Conditioning Equip.		
Chilled Water & Cond. Water Piping	1,050 lf	17.70
Covering Piping	810 lf	5.20
Water Pumps	2 ea	1,132.00
Cooling Tower	lump sum	13,131.00
Ventilating System		
Fans & Machinery		
Fans	lump sum	2,309.00
Unit Ventilators & Air Htg. Units	3 ea	1,396.00
Registers & Grilles	lump sum	113.00
Ducts	8,304 lb	.6475
Covering	lump sum	453.00
Temp. Control	lump sum	764.00
ELECTRICAL WIRING & FIXTURES		
Light & Power Wiring		
Wiring	63,000 lf	.29
Conduit Raceways	20,500 lf	1.09
Motor & Equip. Conn.	lump sum	2,924.00
Panels & Switchboard	lump sum	10,834.00
Electrical Fixtures		
Lighting Fixtures	350 ea	19.83
Outlet Boxes	550 ea	3.43
Wiring Devices	240 ea	2.12
Public Telephone System (Conduit Boxes & Drag Wires)	lump sum	291.00
ELEVATORS & DUMBWAITERS	lump sum	15,500.00
EQUIPMENT	lump sum	12,000.00
Other Equipment		
Metal Cabinets, Etc.	lump sum	6,000.00
Laundry Equipment	lump sum	6,000.00

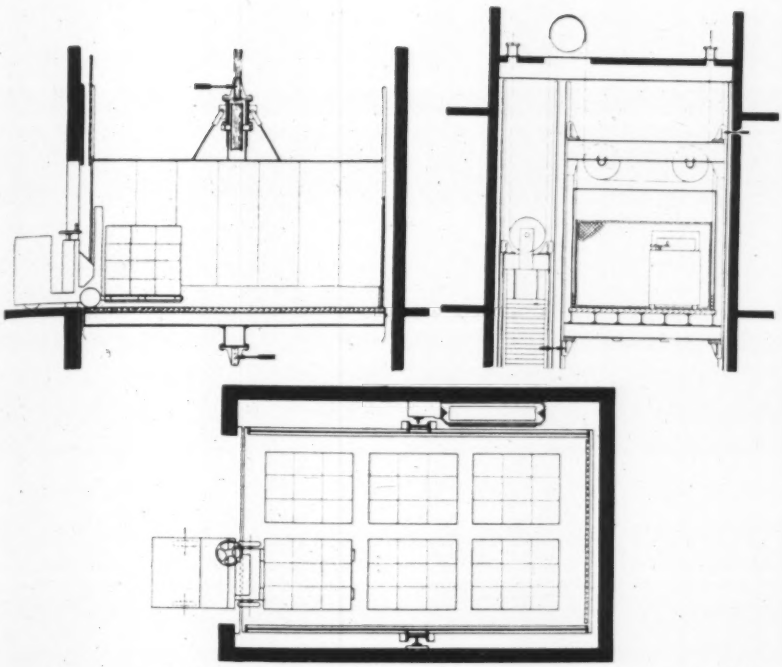


Fig. 1. As a power truck with palletized load enters an elevator, most of the weight of the truck and its load is concentrated at the edge of the platform. Arrows indicate the reactions at the guides (top left and right). For a fully loaded elevator (plan view, bottom), the total load includes most of the truck weight, since the wheels are on the elevator as the last skid or pallet is deposited.

Freight Elevator Costs

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CAREFUL ANALYSIS of freight elevator requirements is important to profitable operations in multi-story factories, warehouses and stores. Since freight elevators form a vital part of the material-handling system, designers require data from elevator manufacturers during the initial stages of planning such buildings to determine the type of equipment, number to install and cost. Following is a method of approximating the initial investment for standard freight elevators.

The first step in making a cost estimate is to select elevator size, capacity, speed and operation. (See "Planning for Elevator Installations," *ENR* Dec. 26, 1946, vol. p. 875), which involves careful consideration of the following:

1. Building characteristics, including the travel, number of floors, floor heights and openings required on two sides of a car. It is also necessary to review structural conditions that may influence the size, shape, or location of the elevator.

2. Units to be carried on the elevator—weight, size, type and method of loading.

3. Number of units to be handled per hour.

4. Probable cycle of operation and principal floors served during the peak of the cycle.

5. Will the elevator handle passengers during periods of peak passenger traffic?

Elevator controls compared

The cost of an elevator is affected by the control equipment selected. There are two types of control—variable voltage and a.c. rheostatic.

In the former, the hoisting motor is direct current; a motor generator set is provided for each elevator, and the speed and direction of motion of the car is controlled by varying the generator field. This type of elevator permits the most accurate stops, the most rapid acceleration and retardation, and the minimum power consumption and maintenance for an active elevator. Automatic leveling to compensate for cable stretch or other variations from floor level is an inherent part of variable-voltage equipment.

Standard speeds with variable-voltage, geared freight elevators are 100, 150 and 200 fpm., with 75 fpm. a popular standard for the 10,000-lb. rating. The recommended application of speeds is as follows: 100 fpm. for two or three floors, 150 fpm. for four or five floors, and 200 fpm. for six to ten floors. If one of the stories exceeds 20 ft. in height, the next higher speed is desirable. Speeds above 200 fpm. are available when needed.

The a.c. rheostatic type is often

TABLE I—ELEVATOR SIZES AND CAPACITIES

Standard Platform Size		Standard Door Size		Standard
Width	Depth	Width	Height	Capacity Rating—Lb.
5 ft. 4 in.	7 ft.	5 ft.	8 ft.	2,500, 3,000
6 ft. 4 in.	8 ft.	6 ft.	8 ft.	2,500, 3,000, 4,000
8 ft. 4 in	10 ft.	8 ft.	8 ft.	4,000, 5,000, 6,000, 8,000
8 ft. 4 in.	12 ft.	8 ft.	8 ft.	5,000, 6,000, 8,000, 10,000
10 ft. 4 in.	14 ft	10 ft.	8 ft.	10,000

Note: Clear inside car width is 4 in. less than given above. Clear depth is 6 in. less for one opening and 8 in. less for openings at both front and rear.

TABLE II—PRICES FOR STANDARD HOISTWAY DOORS

	First Door	Each Additional Door
Power-operated, front opening	$2,300	$975
Power-operated, rear opening	2,175	975
Manually operated, front or rear opening	575	575

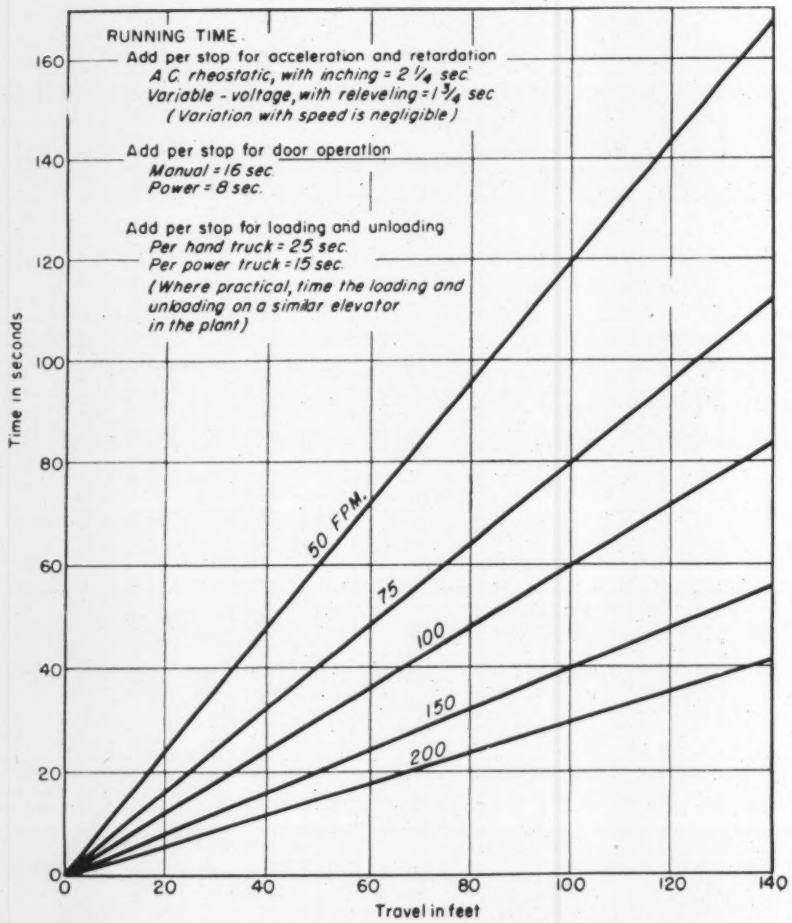


Fig. 2. Curves for estimating the running time for a freight elevator for various lengths of travel. The approximate times to be added for acceleration and deceleration, door operation, and loading and unloading is given in the note.

suitable when it is desired to limit the investment because the elevator is used infrequently—less than 5 trips per hour on a normal business day. Where the normal landing accuracy of this type may not be adequate for the loading methods expected, either of two leveling devices may be installed. One is inching, which may be added to the controller for a single-speed a.c. motor at nominal cost. It permits moving the car to floor level within a limited zone (about 9 in.) with the doors open. The second is automatic leveling, achieved with a two-speed motor and control apparatus. It is available only with selective-collective or single-automatic operation at speeds up to 100 fpm., for capacities up to 8,000 lb., and at 75 fpm., for 10,000 lb. elevators.

Standard speeds for a.c. rheostatic type, geared freight elevators are 50, 75 and 100 fpm. Recommended application of speeds is as follows: 50 fpm. for two floors, 75 fpm. for three or four floors, and 100 fpm. for five to eight floors. If one of the stories extends 20 ft. or more in height, the next higher speed is desirable.

TABLE III—MINIMUM PASSENGER RATINGS FOR FREIGHT ELEVATORS

Car Size	Net Area Sq. ft.	Passenger Rating	Recommended Rating
5 ft. 4 in. x 7 ft.	32.5	2,900	3,000
6 ft. 4 in. x 8 ft.	45	4,350	5,000
8 ft. 4 in. x 10 ft.	76	8,400	8,000
8 ft. 4 in. x 12 ft.	92	10,500	10,000
10 ft. 4 in. x 14 ft.	135	16,600	16,000

TABLE IV—ESTIMATE OF INITIAL INVESTMENT

From Curve A, Fig. 3, for 2 floors	$15,600
From note, Fig. 3, for 3 additional floors	2,100
From note, Fig. 3, for sel.-col. operation	1,800
From Table II, for first front, power door	2,300
From Table II, for first rear, power door	2,175
From Table II, for 5 additional power doors	4,875
Total Budget Price	$28,850

Factors affecting car size

Standard car and door sizes and the capacity ratings that may be provided for each size are given in Table I. The size of the car to be used is generally dependent on the dimensions of the freight package to be carried per trip.

In determining the capacity rating, consideration should be given to the possibility of power trucks being used for placing skidded or palletized material on the car. In loading elevators, such trucks impose more severe strains on the entire car structure and the guide rails than do hand trucks (Fig. 1).

The carrying capacity per hour is determined by the capacity or normal load of the elevator and the time required per round trip. The latter is made up of the following elements:

1. Running time, which may be readily calculated using the speed that is chosen with due allowance for accelerating and retarding time and the distance traveled.

2. Time for operation of the car gate and hoistway doors.

3. Loading and unloading time. It is recommended that wherever practical a study be made of the loading and unloading operations at a similar elevator in the same type of plant.

For a given speed and travel, the running time in seconds, without allowance for acceleration and retardation, may be obtained from the curves in Fig. 2. From the notes in Fig. 2, the additional time required for acceleration and retardation, the average time to be allowed per stop for door operation, and the approximate time for loading and unloading may be estimated.

Another important element in the cost of an elevator is the operation

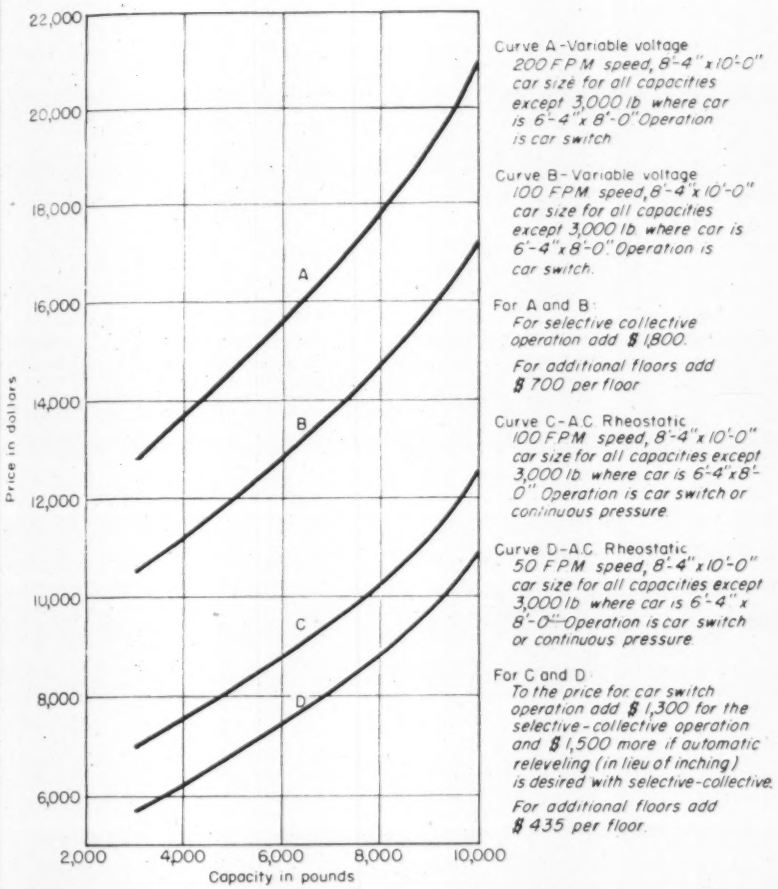

22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
Price in dollars
2,000
4,000
6,000
8,000
10,000
Capacity in pounds
A
B
C
D
Curve A-Variable voltage
200 F.P.M. speed, 8'-4" x 10'-0" car size for all capacities except 3,000 lb. where car is 6'-4" x 8'-0" Operation is car switch
Curve B-Variable voltage
100 F.P.M. speed, 8'-4" x 10'-0" car size for all capacities except 3,000 lb. where car is 6'-4" x 8'-0" Operation is car switch.
For A and B:
For selective collective operation add $ 1,800.
For additional floors add $ 700 per floor
Curve C-A.C. Rheostatic
100 F.P.M. speed, 8'-4" x 10'-0" car size for all capacities except 3,000 lb. where car is 6'-4" x 8'-0" Operation is car switch or continuous pressure
Curve D-A.C. Rheostatic
50 F.P.M. speed, 8'-4" x 10'-0" car size for all capacities except 3,000 lb. where car is 6'-4" x 8'-0" Operation is car switch or continuous pressure
For C and D:
To the price for car switch operation add $ 1,300 for the selective-collective operation and $ 1,500 more if automatic releveling (in lieu of inching) is desired with selective-collective.
For additional floors add $ 435 per floor.

Fig. 3. Cost curves for freight elevators, installed, serving two floors with 15-ft. rise. Notes indicate amounts to be added, exclusive of hoistway door costs, for type of operation and additional floors served.

equipment chosen. The most useful and flexible type of operation for both variable-voltage and a. c. rheostatic freight elevators is selective-collective equipment with an annunciator. When operated without an attendant, the car automatically answers the down-calls as approached when moving down and similarly answers the up-calls when the car is moving up. The elevator attendant, when present, has complete control of the car and can answer calls indicated in the annunciator by pressing the corresponding car button.

The single-automatic type, available for both variable-voltage and a. c. rheostatic controls is a somewhat simpler, less expensive type for operation without an attendant, but has the disadvantage that corridor calls cannot be registered when the car is in motion, nor can the car respond to more than one call at a time.

If an attendant will always operate the elevator, use may be made of car-switch releveling, which is a simple, inexpensive means of operating with variable-voltage control. In response to the movement of a switch, the car will travel in either direction, or stop, leveling automatically at each floor.

There is also a car-switch type of operation for freight elevators with a.c. rheostatic control. The car is leveled to a mark on the hoistway door by the attendant using the normal car switch.

The least expensive type of operation is the continuous-pressure type. It is available for light-service a.c. rheostatic elevators. Buttons are installed in the corridor and car and, when pressed, will cause the car to move in a selected direction. The car will stop when the button is released. This control is not recommended for over 70 ft. of travel.

Cost of hoistway doors may amount to a relatively high proportion of the initial investment for a freight elevator. An estimate of cost is given in Table II for standard manually and power-operated doors installed. (The standard hoistway door is the vertical bi-parting metal-clad wood type.) For active elevators and openings wider than 3 ft., doors should be power operated.

When passengers are carried on a freight elevator, the most important safeguards are: 1. A capacity rating equal to that of a passenger elevator with same net area. 2. Interlocks on hoistway doors instead of locks and contacts. 3. Interlocking of the car gate and the counterbalanced hoistway door, so that the hoistway door opens first and the car gate closes first to eliminate the tripping hazard. This third requirement is met preferably by use of power-operated doors and gates with sequence operation. The door time with sequence operation is the same as for manual doors.

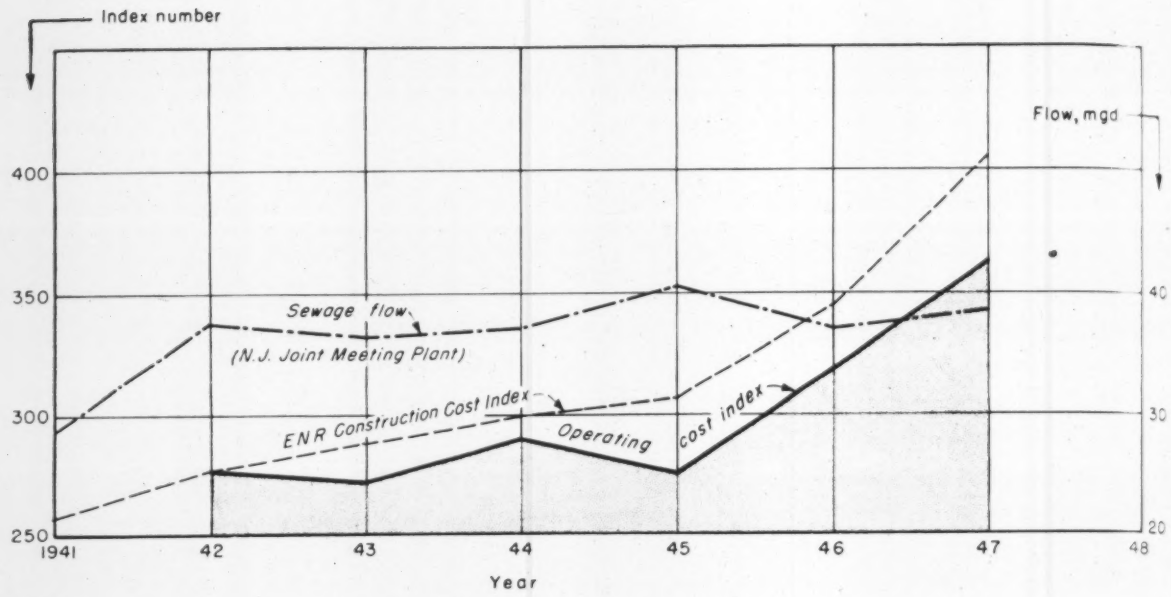
Minimum passenger ratings for the standard freight cars based on net area are given in Table III.

Curves aid cost computation

The basic information previously discussed concerning the initial investment for standard freight-elevator equipment has been taken into account in Fig. 3 to simplify calculations. The curves give the costs on an installed basis for standard freight elevators serving two floors, each with a 15-ft. rise. For each additional floor to be served, the amounts to be added are indicated in Fig. 3, and prices for hoistway doors must also be included.

As an example, an estimate will be made of the initial investment for a freight elevator of 6000-lb. capacity, size 8 ft. 4 in. x 10 ft., with variable-voltage control and selective-collective operation. Number of floors to be served is five (one story height over 20 ft.). Thus, the speed will be 200 fpm. Front openings will be used at all floors and rear openings at two floors, with power operation of all doors. The computation is shown in Table IV.

This information on standard apparatus is offered as a guide in the consideration of freight elevators for general use. Other apparatus is available to provide greater capacity, higher speed or other variations from the normal, when required to suit unusual conditions.



With indexes increasing faster than flow, one plant finds . . .

• • • Sewage Treatment Costs up 40 Percent

OPERATION and maintenance costs at the Joint Meeting sewage-treatment plant, Elizabeth, N. J. have increased nearly 40 percent since 1942. This trend—which is still upward but beginning to level off—was analyzed by Leslie E. West, chief engineer of the plant, at a recent meeting of the New Jersey Sewage Works Assn.

Serving twelve communities in eastern New Jersey (Table I), the Joint Meeting plant provides only primary treatment. Settling tanks are designed for flows of 50 or 100 mgd. at 4 or 2-hr. detention, respectively. Other facilities are designed to handle peak flows of 172 mgd.

To study operating-cost trends, Mr. West improvised a "Cost Index Scheme" that parallels the *ENR* Construction Cost Index and is based on the 1942 value of 276.31. Total operating costs for the succeeding six-year period were as follows:

Year	Total Cost
1941	$ 92,266
1942	108,013
1943	106,765
1944	112,768
1945	108,188
1946	124,644
1947	142,293

The base year has been taken as 1942 since Elizabeth, N. J. began to contribute sewage late in 1941.

Analyzed individually, component costs—such as maintenance and supplies, fuel, labor and salaries, barging, and insurance and bonds—showed varying percentages of increase. In Table II, for example, it is shown that in the period 1945-47 maintenance and supplies costs jumped 39.5 percent. Completion of a number of war-deferred items in 1946 produced a high index value for that year.

Similarly, expenditures for fuel increased over 43 percent. Mr. West anticipates that fuel costs will be much higher for 1948, reflecting an unusually severe winter and rising prices.

Salaries are higher

Salaries and wages have increased about 41 percent since 1945. The upward trend (Table II) indicates that salary standards are roughly equivalent to those established for industrial workers.

Under a three-year contract, disposal of sludge at sea incurs only

TABLE I—APPORTIONMENT OF SEWAGE-TREATMENT COST AMONG MUNICIPALITIES SERVED BY JOINT MEETING PLANT (1947)

Municipality	Population (Connected to trunk sewers)	Cost (Apportioned on flow)
East Orange	21,000	$6,057
Hillside	24,000	6,608
Irvington	61,000	18,551
Maplewood	25,000	11,399
Millburn	13,000	5,287
Newark	50,000	15,948
Roselle Park	10,000	3,939
South Orange	15,000	7,720
Summit	19,000	8,326
Union	32,000	9,718
West Orange	28,000	13,463
Elizabeth	68,000	35,276
Totals	365,000	$142,292
Yearly per capita cost		39¢

TABLE II—COSTS OF MAINTENANCE AND SUPPLIES, FUEL AND LABOR AND SALARIES

Year	Maintenance and Supplies	Index	Fuel Cost	Index	Labor and Salaries	Index
1945.....	$4,617	276.76	$1,264	276.76	$49,662	276.76
1946.....	7,729	463.28	1,340	293.49	61,018	340.05
1947.....	6,441	386.07	1,808	395.88	69,833	389.17
	Increase—39.5%		Increase—43.0%		Increase—40.6%	

TABLE III—COSTS OF BARGING AND INSURANCE AND BONDS

Year	Barging	Index	Insurance and Bonds	Index
1945.....	$32,963	276.76	$1,345	276.76
1946.....	34,196	287.12	1,873	385.55
1947.....	34,781	292.04	1,840	378.71
	Increase—5.5%		Increase—36.8%	

cost of barging, as pumping into barges is a plant function. Disposal costs are based on quantity of sludge delivered to the barges. Consequently, expenditures for barging are fairly uniform and roughly proportionate to the population served. The small increase in cost—5.5 percent (Table III)—is said to be the result of careful supervision.

In contrast, insurance and bond costs rose about 37 percent in the same period.

Principal treatment steps for this primary plant are:

Screening—3-in. bar racks and ¾-in. mechanically cleaned units. Collected material is ground and disposed of with sludge.

Grit removal—Continuous mechanical collection of settled particles that are ejected pneumatically at regular intervals through a pipeline for disposal as fill.

Sedimentation—Four settling tanks equipped with mechanical scrapers. Sludge pumped to storage. Effluent discharged 20 ft. below water surface in a major channel of New York harbor.

Sludge disposal—Solids are increased from 5-6 to 8-10 percent in two 70-ft. tanks by controlled decantation. Sludge barged to sea every two weeks in 3,000-ton lots.

Treatment equals or exceeds requirements of New Jersey State Department of Health and the Interstate Sanitation Commission for discharge of effluent into class "B" waters.

Land-Use and Stream-Turbidity Study Started

Initial plans for correcting turbidity as an element in stream pollution were placed before a recent meeting of the Interstate Commission on the Potomac River Basin in Harrisburg, Pa.

To this end, a newly appointed land-use committee held its first meeting at the Harrisburg conference. David L. Seckinger, assistant health officer, District of Columbia, was elected chairman. Consisting of 14 members, the committee includes soils and argicultural technologists from the four basin states (Maryland, Pennsylvania, Virginia and West Virginia) and several representatives of the U. S. Department of Agriculture, headed by Hugh H. Bennett, chief, Soil Conservation Service.

Prime purpose of the committee is to devise workable plans for correcting stream turbidity during periods of heavy runoff. Its program is directed to abate soil erosion and consequent silting which has already spoiled fishing areas, covered two productive oyster beds and required repeated dredging of navigation channels. To carry out its objective, the committee adopted a five-point program: arouse public interest in good land use; encourage good practices of land management and conservation: coordinate efforts of public agencies; stimulate research; and determine sources and degree of silt deposition.

To develop information on pollution problems caused by improper land use, the committee agreed to select a stream for study. The Monocacy River in Maryland was suggested. The committee will give further consideration to this project at its next meeting.

Water sampling produces results

Good results already have accrued from the commission's cooperative water sampling program. Water samples from main streams of the Potomac River basin are taken and analyzed at 36 stations which functioned continuously during 1947. The commission plans 17 additional stations to round out its 53-station program.

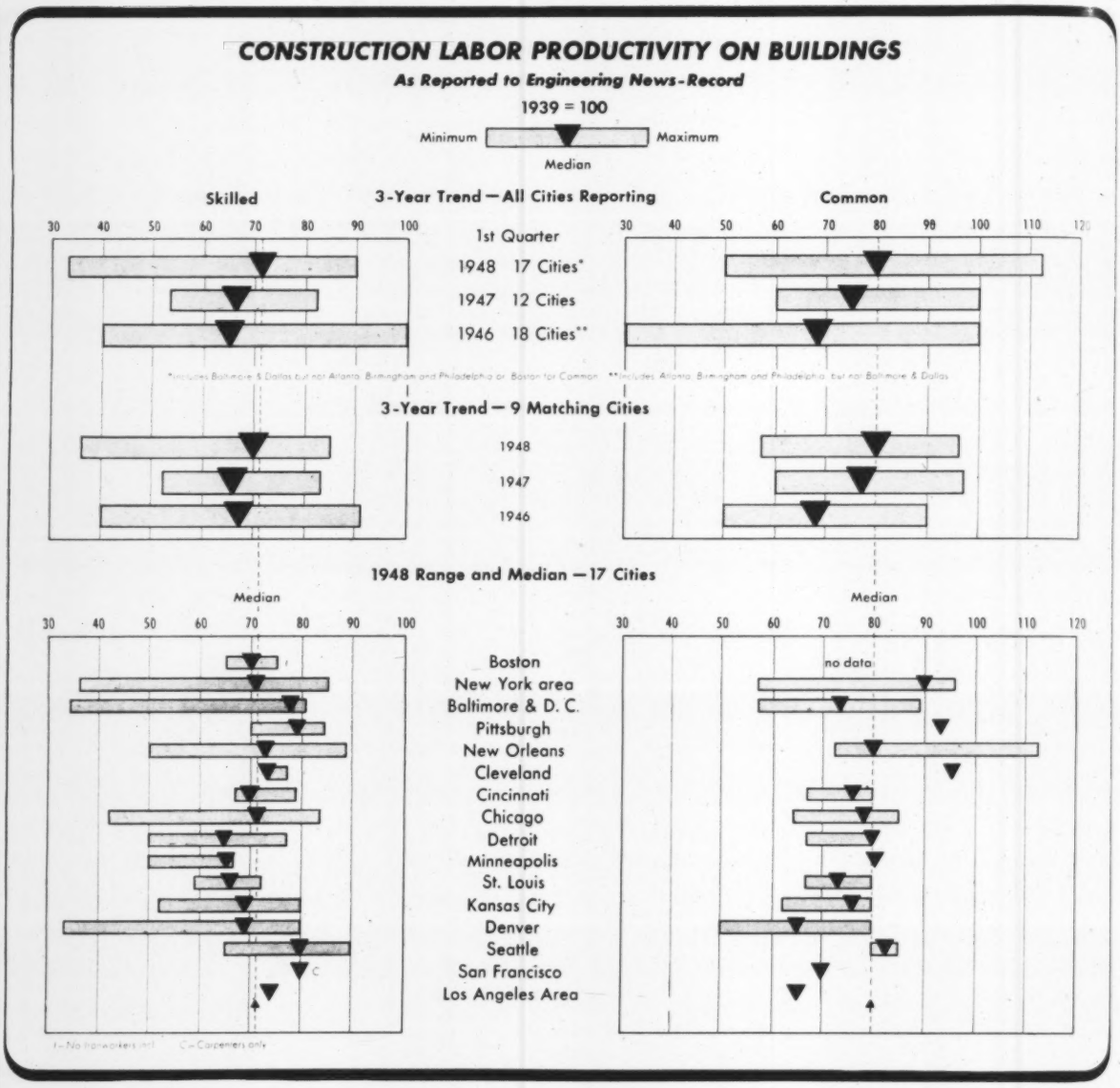
Most of the stations are operated by industries and municipalities. Samples are taken weekly or oftener in dry weather and at least once every two weeks in winter.

Additional gaging stations are needed for stream-flow data. The commission is cooperating with the U. S. Geological Survey to advise on location of new stations at points of basin-wide significance or where pollution problems exist.

A preliminary report on research studies of the North branch of the Potomac River at Cumberland, Md. indicated rather rapid recovery of a swift-flowing, shallow stream from organic pollution. The research program is under way at Johns Hopkins University with James Morgan, graduate student, making the studies under the direction of James E. Renn, professor of sanitary engineering.

Mr. Morgan's interim report pointed out serious overloading of the "pool" by large volumes of polluted water flowing into it without proper means of aeration. The project will continue to investigate changes which take place in various kinds of sludge deposited by the fast-moving streams as well as the effectiveness of low over-flow aeration barriers in the streams.

Work is going ahead on a new publication, "Financing of Sewage Facilities," designed to help local communities. Edwin R. Cotton, engineer secretary of the commission, reported that the first draft would be ready for the next quarterly meeting.



Construction Productivity Rising

Engineering News-Record's third annual survey, shows skilled building labor productivity up to 71 percent of 1939 from 66 percent in 1947. Common building labor productivity is up to 80 percent from 75 percent.

These measures of productivity have been reported for 1948 by 34 contractors in 17 of the 20 cities for which *ENR* reports monthly prices and wages. Only 12 cities were covered in the 1947 study. Comparing results in the nine matching cities shortens the range somewhat, but does not materially change the median.

Another check on 1948 productivity is given by other contractors reporting on areas outside the 20 price reporting cities. These show median skilled labor productivity of 71.5 percent and median common labor of 77 percent of 1939. The range is within the range reported for the *ENR* pricing centers.

The maximum, minimum range shows conditions to be spotty within areas as well as across the country. Skilled labor ranges from 33 percent to 90 percent of 1939 productivity, and common labor from 50 percent to 112.5 percent.

This year, for the first time, productivity is reported separately by the three skills used in *Engineering News-Record* skilled wage average—carpenters, bricklayers and ironworkers. Of these, bricklayers show the lowest productivity with a range of 33 percent to 81.5, median 69 percent of 1939. Carpenters are a little higher with a 36 to 85 percent range and 72.5 median, and ironworkers are highest with a 52.5 to 90 percent range and 73 percent median.

Several contractors expressed the belief that productivity would continue to rise, particularly if the labor supply improves and as more ap-

prentices graduate to journeymen. The leading reason given for low productivity was the shortage of men.

Some improvement of labor supply is noted in the first quarter of 1948. According to another survey by *Engineering News-Record* only 35 of the 59 cities canvassed for wage rates for this issue reported skilled labor shortages; this is 60 percent of the reporting cities compared with 75 percent that cited shortages in September. Common labor is short in only 5, or 8½ percent, of the 59 cities compared with 18½ percent of the cities checked in September, 1947.

Reasons given for improved productivity include: "steel erectors, demand decreased since 1946"; "surplus of laborers". (Cleveland and Baltimore): "material supply better", "better supply of carpenters and ironworkers" (Kansas City): "mechanization" (New Orleans), "carpenters and metal lathers in better supply" (New York): "slight decrease in average due to apprentices becoming journeymen"; "increasing availability of materials, competition for jobs in some crafts beneficial" (Seattle); and "possibly some gain due to Taft-Hartley Act". (Chicago).

Reasons given for continuing low productivity include,

Baltimore: demand for carpenters, until recently exceeded supply, bricklayers still scarce.

Chicago: large volume of work, shortage of men, higher pay in factories, shortage of materials, incompetent individual workers, incapable supervisors at foreman level, union restrictions and regulations.

Cincinnati: shortage of men, average age high, lack of interest, shortage of materials, substitutions, green lumber which has to be constantly worked over, hard wood dimension lumber instead of standard materials, extra lengths or weights of steel that need adjusting on job.

Cleveland: shortage of skilled men.

Denver: indifference of carpenters and ironworkers, bricklayer shortage, laborers quotas and featherbedding; wages high and jobs are plentiful so that the need for work is lacking as an incentive.

Detroit: shortage of men, average age high, lack of interest, increase in cost due to carelessness, necessity for more supervision, more loss of tools and materials due to indifference.

FORMULA FOR COMPUTING CHANGES IN LABOR PRODUCTIVITY

$$\frac{\text{1948 Theoretical Cost}}{\text{1948 Actual Cost}} = \text{Productivity \% of 1939}$$

Theoretical cost = $1 unit of work in 1939 plus percent increase in hourly wage rate for trade studied

Actual cost = present cost from experience records of the same unit of work that cost $1 in 1939

Kansas City: shortage of men including masons; large part of available men acquired union cards and what skill they have during war years, trend of unions toward classifying common labor as skilled, with shortage of good experienced laborers tendency is to carry the labor crew through slack days.

New Orleans: shortage of men, featherbedding. Most of former mechanics have hired themselves out as foremen and superintendents and present mechanics are not as experienced.

New York: average age high, not enough apprentices.

Pittsburgh: shortage of men, bonus payments by speculative and broker contractors, which decrease incentive of bricklayers and ironworkers to produce.

St. Louis: average age high, cost of material handling up, because carpenters and iron-workers refuse to allow laborers to serve them or handle their material, strikes and featherbedding, 6 days work for 7 days pay, or 9 hours work for 10 hours pay.

San Francisco: jobs too plentiful and labor scarce. This is beginning to change.

Seattle: masonry continues low.

PRODUCTIVITY IN AREAS NOT SHOWN ON CHART OF 1939

	Skilled Workers			Common Labor		
	Min.	Med.	Max.	Min.	Med.	Max.
Composite of 5 areas, incl. Philadelphia, New Jersey, Baltimore, Southern Ohio, Kentucky	70	74	83	77	77	77
Southern Virginia	60	80	85	85	85	85
Gulf Coast*	71*	71.5*	72*	63	63	63
Composite, areas listed	60	71.5	85	63	77	85

* No bricklayers included.

SKILLED PRODUCTIVITY COMPARED BY TRADES FOR 17 CITIES —% OF 1939

	Minimum	Median	Maximum
Carpenters	36	72.5	85
Bricklayers	33	69	81.5
Ironworkers	52.5	73	90
3 Skilled Combined	33	71	90

Area including *Philadelphia, New Jersey, Baltimore, Southern Ohio and Kentucky*: shortage of men, changes in jurisdiction, variations in recognized or contract working period, rule changes. For example:

Reinforcing steel formerly set by labor at 61¢, is now set by ironworkers at $2.40, who also unload and carry. Laborers formerly unloaded pipe but today in Jersey pipefitters and helpers must unload it. Theoretically, certain number of pipefitters' helpers are on current jobs but actually all pipefitters' helpers have been rated up to pipefitters and enjoy the higher wage rate.

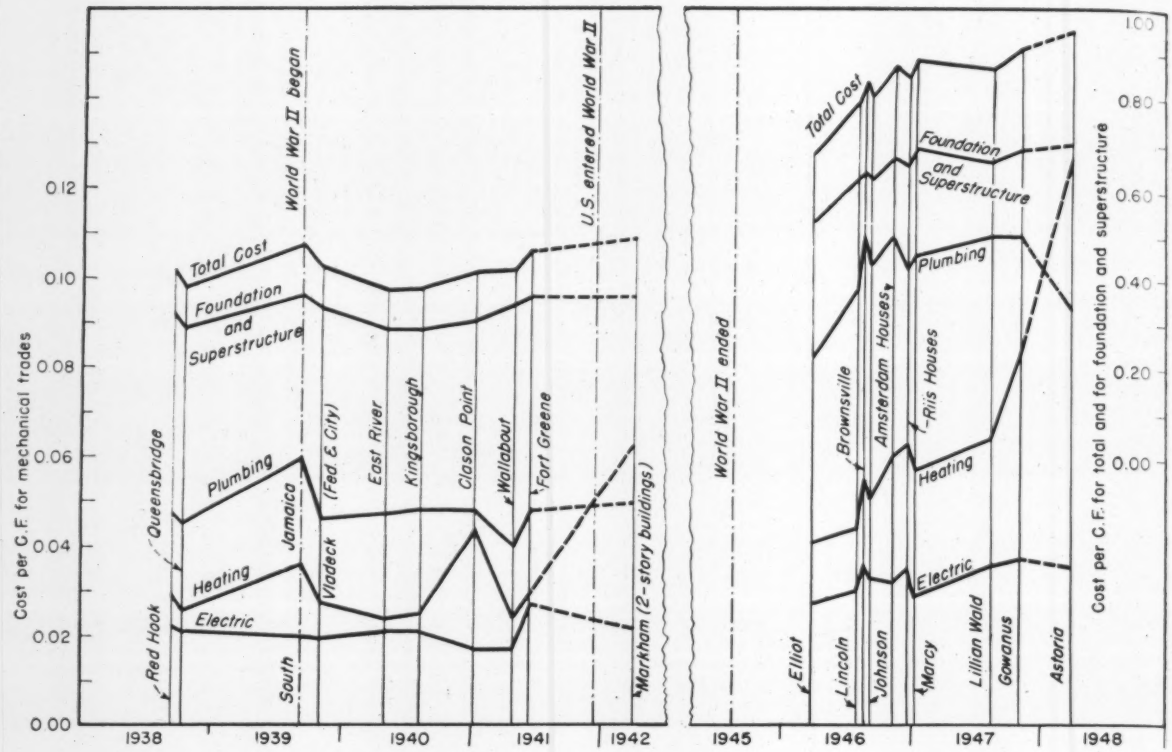
Bricklayers in this area get $2.50 an hour, for a 7 hour day. If other trades work 8 and bricklayers have to accompany them, bricklayers get one hour overtime at double time, thus are paid for 9 hours, an increase of 12.5 percent.

Thus rule changes, which have nothing to do with individual worker output affect overall job productivity. These include up-grading of labor from helpers to mechanics, working rules which now allow overtime pay within the 40 hour period, working rules which require that a foreman be paid the full week whether his men work the full week or not.

The contractors who compute these productivity records were given a choice this year of changing the base from 1939 to 1946, but by a 3 to 1 vote preferred the 1939 base. It is increasingly difficult to find current work that matches or is comparable to work done in 1939, and 25 contractors reported that their first quarter 1948 work was not comparable with their 1939 operations. Brickwork, for example, backed by concrete block instead of brick as in 1939, or work late getting started due to bad weather, are typical reasons for their not contributing to this study.

Several contractors have recommended that productivity measures in the fall would be better than in the spring, because jobs would be tuned up to a higher tempo, and the experience records stabilized.

These contractors who have taken time out to supply these productivity data during their busiest bidding season get no reward other than the knowledge that they are making available to their industry new data affecting costs that has long been needed.



Cost Trends for Low-Rent Projects

THE TOTAL COST of construction per cubic foot of building has increased only 8 percent during the last year for the New York City Housing Authority low-rent apartment houses. In contrast, the total cost has risen 94 percent since the United States entered the war, and 40 percent since early 1946. The apparent leveling-off might mean that building costs are about at a peak.

The variation in costs for the vari-

CONTRACT TOTALS FOR SOME POSTWAR HOUSING PROJECTS

Name of Project	Lincoln	Johnson	Marcy	Amsterdam	Riis	Lillian Wald	Gowanus
Total Rooms	5,432	5,484	7,321	4,586	7,424	7,702	4,869
Total Apartments	1,286	1,310	1,717	1,084	1,768	1,861	1,139
Total Cu. Ft.	10,796,154	10,750,768	14,029,520	8,259,493	14,314,100	14,691,881	9,140,715
Award Date*	9-25-46	9-25-46	2-19-47	12-13-46	3-13-47	9-24-47	12-9-47
Foundations and Superstructures	6,702,967.00	6,661,002.00	9,665,107.00	5,519,476.00	9,314,100.00	9,686,000.00	6,263,400.00
Cost Per Const. Room	1,233.98	1,214.62	1,320.19	1,203.55	1,254.59	1,257.60	1,286.38
Cost Per Apartment	5,212.26	5,084.73	5,629.07	5,091.77	5,268.16	5,204.73	5,499.03
Cost Per Cu. Ft.	0.621	0.619	0.689	0.668	0.650	0.659	0.685
Heating	474,757.00	537,814.00	804,568.00	493,119.00	897,699.00	937,519.00	751,750.00
Cost Per Const. Room	87.40	98.07	109.90	107.52	120.92	121.72	154.39
Cost Per Apartment	369.17	410.54	468.59	454.91	507.75	503.77	660.01
Cost Per Cu. Ft.	0.044	0.050	0.057	0.060	0.063	0.064	0.082
Electric	327,365.00	351,048.00	403,616.00	267,044.00	501,000.00	537,997.00	339,990.00
Cost Per Const. Room	60.27	64.01	55.13	58.23	67.48	68.03	69.83
Cost Per Apartment	254.56	267.98	235.07	246.35	283.37	281.57	298.51
Cost Per Cu. Ft.	0.030	0.033	0.029	0.032	0.035	0.0357	0.037
Plumbing	1,059,059.00	1,106,324.00	1,467,844.00	969,600.00	1,453,000.00	1,599,750.00	993,770.00
Cost Per Const. Room	194.97	201.74	200.49	211.43	195.72	207.71	204.10
Cost Per Apartment	823.53	844.52	854.89	894.46	821.83	859.62	872.49
Cost Per Cu. Ft.	0.098	0.103	0.105	0.11	0.102	0.109	0.109
Total Cost	8,564,148.00	8,656,188.00	12,341,135.00	7,249,239.00	12,165,799.00	12,747,266.00	8,348,910.00
Cost Per Const. Room	1,576.62	1,578.44	1,685.71	1,580.73	1,638.71	1,655.06	1,714.70
Cost Per Apartment	6,659.52	6,607.77	7,187.62	6,687.49	6,881.11	6,849.69	7,330.04
Cost Per Cu. Ft.	0.793	0.805	0.880	0.877	0.850	0.868	0.913
Cost of Piling	715,000.00	None	474,000.00	65,000.00	1,542,300.00	1,703,000.00	193,600.00

Note: The above analysis is adjusted for the accepted alternates on all contracts except for Gowanus Houses. It does not include piling, elevators, refrigerators, gas ranges or site improvements. * General Construction or Superstructure.

ous authority projects on which bids were taken from 1938 to 1948 are plotted in the accompanying chart. The costs are given per cubic foot of building for the total, for foundations and superstructures, for plumbing, for heating and for electric installations. Piling, elevators, refrigerators, gas ranges or site improvements are not included.

In the table, similar cost data are given for seven of the ten postwar projects on which bids have been taken, and in addition, the number of rooms and apartments and the total volumes are listed. Data for two projects have been published previously—Brownsville in *ENR* Aug. 21, 1947, vol. p. 272, and Elliott in *ENR* April 17, 1947, vol. p. 584—both with complete breakdowns of costs.

Bids on heating and ventilating for the Astoria houses, taken in March, 1948, have been rejected as being too high. The apparent decrease in costs for plumbing and electrical systems for this project is due to increased volume of rooms and not to deflation of prices. With the increase in room size, it would be expected that heating cost also would drop, but instead it shows a phenomenal rise in bids for the Astoria project.

Emergency Controls on Construction—1941-1948

During the war years numerous controls were placed on construction or were applied to civilian activities closely related to construction. Many of these restrictions were modified after the emergency had passed and most of them now have been removed entirely.

As these restrictions had a bearing on contracts entered into by builders and suppliers of materials during the war years, such concerns have found subsequently that it is of importance to them to know the exact date when some of the controls were applied or removed.

The following table of war-time controls was prepared by the Construction Division of the U. S. Department of Commerce for Engineering News-Record to supply those dates. About 100 minor controls are not included as most or all of them now has no significance.

To save space, abbreviations have been used for the following issuing agencies: OPACS—Office of Price Administration & Civilian Supply; SPAB—Supply, Priorities & Allocation Board; WPB—War Production Board; CPA—Civilian Production Administration; and OHE—Office of the Housing Expediter.

DATE OF ISSUE AND REMOVAL OF EMERGENCY CONTROLS OVER CONSTRUCTION OR RELATED OPERATIONS

Name of Issuing Agency	Name of Regulation	Date	General Provisions
OPACS	Civilian Allocation Program	June 4, 1941	First Civilian Allocation Program to restrict non-defense uses of iron and steel.
SPAB	L-1	Aug. 30, 1941	First limitation order issued restricted manufacture of trucks.
SPAB		Oct. 9, 1941	SPAB announced restrictions on non-essential building and construction by withholding of priorities assistance.
CONGRESS	Emergency Price Control Act.	Jan. 30, 1942	One of basic war powers acts approved.
CONGRESS	Second War Powers Act	Mar. 27, 1942	Provided for seizure of property, enforcement of priorities and rationing.
WPB	L-41	April 9, 1942	Halted all construction not essential to public health and safety.
CPA	PR-33	Dec. 19, 1945	Effective on Jan. 15, 1946, this regulation for channeling materials used in residential construction ordered set-asides of materials on the producers' level and gave priorities on materials to builders who would construct new dwellings for sale at $10,000 or less or to rent at $80 per month and grant preference to veterans.
CPA	VHP-1	Mar. 26, 1946	Forbade the beginning of construction and repair work (with minor exceptions) unless specifically authorized by the CPA.
OHE		May 22, 1946	Veterans emergency housing act passed. Provided $400 million for subsidies to spur production of bottleneck materials, extended mortgage insurance, gave veterans preference in purchase or rental of new homes and continued priorities and allocations powers.
Removal orders:			
WPB	Amendments to L-41	May 29, 1945	Controls on construction eased by amendment to L-41 providing for construction or alteration of industrial facilities for producing bottleneck items or components and essential civilian items in short supply.
WPB	Amendment to L-41	Aug. 21, 1945	Authorization by WPB for construction of industrial facilities no longer required.
WPB	L-335	Sept. 12, 1945	Lumber controls ended effective Sept. 30.
WPB	L-41	Sept. 18, 1945	Announcement of end of all restrictions on building and construction effective Oct. 15, 1945. Also ended price ceiling (of $8,000) on residences.
President of the U. S.	Price decontrol	Nov. 9, 1946	All controls over wages, salaries and prices removed. Rent control continued but building materials prices were included in decontrol action.
OHE		Dec. 24, 1946	$10,000 price ceiling on new houses eliminated, ended the priority system for materials, continued allocation of some raw materials and provided for relaxation of controls on non-housing construction; established permit system for home building.
OHE		May 31, 1947	Permits for construction of homes designed for year round occupancy no longer required.
CONGRESS	Housing and Rent Act of 1947 (P. L. 388)	July 1, 1947	Repealed rent control provisions of Emergency Price Control Act of 1942, permitted increase up to 15 percent in rentals paid and abolished the allocation and priority powers of the Housing Expediter although veterans' preference was retained. All construction was permitted without restriction except for certain amusement and recreation projects.
CONGRESS	Housing and Rent Act, 1948	April 1, 1948	Continued rent control to March 31, 1949. Scrapped all restrictions on the use of scarce building materials for amusement and recreation facilities.

Construction Cost-Control Simplified

Irving H. Winslow
Morton C. Tuttle Co.
Holbrook, Mass.

ITEM — Job No. *531*

TABLE I

Floor plank & Nailers — MATERIAL COST RECORD

Estimated Budget Quantity *136M* — Unit Cost *123* — Total Cost *16730*

Date	Bought From	Description	Number: Car	Number: Inv.	Number: Check	Number: Statement	Cost Billed	Credits	Net Cost to Date
5/7	Brown Lumber Co.	7012'—#1 LLY Pine 3x8		215	142	9	84523		84523
5/8	" " "	5256' " "		216	"	9	63356		147879
5/15	" " "	5224' SE " " 3x6		269	171	10	62970		210849

ITEM — Job No. *531*

TABLE II

Forms, Footings, Piers, Walls and Grade Beams — Make — LABOR COST RECORD — Symbol *F1M*

Estimated Budget Quantity *630 sfb.* — Unit Cost *8 00* — Total Cost *5040 00*

Notes	Week Ending	Weekly Labor	Man Hours: Weekly	Man Hours: To Date	Labor to Date	Quantity: Week	Quantity: To Date	Unit Cost to Date	Budget Quantity × Unit to Date	Indicated: Saving	Indicated: Over-Run
	4/23	36300		242	36300		35	10.37	6533		1493
	4/30	42900	286	528	79200	111	146	5.42	8415	1625	
	5/7	41200	274	802	120400	69	215	5.60	9528	1512	

TABLE III

TIMEKEEPER'S FIELD SHEET — Sheet No. *3* — Date *11/5/47*

Job No. *531* At *Bangor, Maine*

Man's No.	Operation Symbol	*F1M*	*F1E*	*F1S*	*F2M*	*F2E*	*F3M*	Rate	Amount	Hours: Reg.	Hours: O. T.	No.
1					4		4	1 50	12 00	8		1
2						8		1 50	12 00	8		2
3						8		1 50	12 00	8		3
4			8					1 50	12 00	8		4
5		8						1 50	12 00	8		5
					4		4	1 50	12 00	8		6
												7
44												
45		8						1 50	12 00	8		45
46				4	2		2	1 50	12 00	8		46
47				8				1 00	8 00	8		47
48		8						1 00	8 00	8		48
49				8				1 00	8 00	8		49
50				8				1 00	8 00	8		50
Total Man Hours		56	72	32	160	64	16		584 00	400		Total
Amount		80 00	108 00	36 00	240 00	96 00	24 00					

A BASIC PROBLEM of estimators is to obtain inexpensively from one job the cost data which will aid in forecasting the cost of the next job. The simple solution which this article presents is a synthesis of the more useful features of cost-accounting systems now used by several well-known construction organizations.

Shown in Tables I and II are designs for ledger forms in which permanent and current cost information can be recorded with a minimum of bookkeeping entries. The forms are designed not only to maintain current records but to act as a ready reference for future cost studies. Both ledger pages are made up on the same size sheet to fit standard end-bound covers (sheets 14 x 8½ in., with two holes punched at the left-hand end 4 1/16 in c. to c.). An invoice-ledger page of conventional style should be designed in this size pattern, so that at the end of each job complete records may be filed in one ledger binder.

If unit costs were not important, it would be simpler to record both material and labor distribution for an assigned charge on the same page in one general ledger. Material costs can be fairly well established early in the life of a job, but labor figures change as the work progresses—making accurate weekly unit-labor cost essential if prospective over-runs are to be spotted. The labor-cost ledger is referred to constantly, and unless the job is very small, the information contained therein is assembled by someone other than the material man. For these reasons it has been found most practical to keep the figures in separate ledgers.

The importance of employing a field timechecker of proven ability cannot be over-emphasized if an accurate control of field costs is to be attempted. The entire labor-cost system depends upon the ability of this

TABLE IV

Payroll No. 10 — Job 531 — For Bangor Cotton Mills, At Bangor, Maine — Sheet No. 2 — From 10/28 To 11/3

	O.T. Brot Fwd.	Thu. Reg.	Thu. O.T.	Fri. Reg.	Fri. O	Fri. G	Fri. O.T.	Wed. Reg.	Wed. O.T.	Hours	Hours 1½	Hours 2	Pay Hours	Rate	Gross Amount	Deductions	Deductions W-T	Net Amount	Name	W-T Class	Trade	Check No.	Date Pd. On	
51		8		8				8		40		8	56	1.50	8400	84	540	7776	A. Brown	5	Carpenter	521		51
52		8		8				8	2½	40		10½	61	1.50	9150	92	1020	8038	D. Jones	3	"	522		52
53		8		8				8		40			40	1.50	6000	60	870	5070	C. Smith	1	"	523		53
54																								54
55																								55
95																								
96																								
97																								
98																								98
99																								99
100																								100

field man to make the proper distribution of costs as they occur.

A system of cost symbols is necessary to aid the field timechecker in labor cost distribution. Since the idea is to use as few digits or letters as possible to indicate a given operation, a combined letter-numeral code is preferable. Thus, F1 might indicate forms for foundations, piers and grade beams; F2, floor beams and girders; F3, floor and roof slab.

If a further breakdown is desired, F1M might well indicate the make-up for forms for foundations, piers and grade beams, F1E the erection and F1S the stripping operation. The letter S is suggested to indicate all metal work, with S1 covering setting base plates, S2 for column erection and the like. It is possible to set up a symbol system to cover practically every operation using four or less digits or letters per operation.

A field timekeeping sheet is shown in Table III. This is designed to be superimposed on the payroll for hour take-off by the payroll clerk. It will be noted that this sheet is numbered, as is the payroll, from 1 to 50. Similar sheets numbered 51 to 100, both timekeeper's field sheets and payroll, are required so that any number of complete hundred series may be used.

When the timekeeper's sheet is completed for the day, the number of straight time and overtime hours appear on the outer right-hand columns for easy transfer to the payroll, by merely laying the sheet next to the properly dated column. In the column preceding the hour column the total daily wage is recorded.

At the bottom of the sheet appears the labor distribution, both man-hours and money. These may be proved against the totals of the three vertical columns at the right. The figures at the bottom of the sheet now represent a recapitulation of the day's work by symbols in money and man-hours and may be transferred to a weekly "recap" sheet. When complete this is, of course, posted in the labor-cost record, Table II.

The horizontal lines of the payroll sample shown in Table IV are exactly spaced to conform with the spacing of the horizontal lines on the field-timekeeper's sheet.

The suggested method of wage calculation in the above; namely, resolving straight time, time and a half and double time into pay hours, requires less effort, less arithmetic and hence offers fewer chances for error than many methods now in use.

The weekly labor-cost summary is

Sheet No. 2

TABLE V

LABOR STATEMENT

Job No. 531 — Statement No. 11 Through 10/18

Symbol	Description	Week's Cost	Quantity: Unit of Meas.	Quantity: Est. Total	Quantity: Actual to Date	Unit Cost: Est.	Unit Cost: Actual to Date	Cost: Est. Total	Cost: Actual to Date	Cost: Probable Final	Estimated: Saving	Estimated: Over-Run
	Forms (Make, erect, strip)											
F1M	Footings,		Sqs	63	63	8.00	5.94	504	374	374	130	
F1E	piers, walls,		Sqs	173	173	30-	27-	5190	4671	4671	519	
F1S	grade beams	36.00	Sqs	173	124	6.00	6.49	1038	805	1123		85
F2M	Slabs, beams,	160.99	Sqs	60	32	10-	10.32	600	330	619		19
F2E	girders	210.68	Sqs	93	17	27-	28.09	2511	478	2612		101
F2S	Slabs, beams, girders		Sqs	93		10-		930		930		

Sheet No. 2

TABLE VI

MATERIAL STATEMENT

Job No. 531 — Statement No. 1 Through 11/1

Description	Unit of Meas.	Estimated: Quantity	Estimated: Unit Cost	Estimated: Total Cost	Actual to Date: Quantity	Actual to Date: Unit Cost	Actual to Date: Total Cost	Probable Final Cost	Indicated: Saving	Indicated: Over-Run
STEEL AND IRON										
Steel reinforcement & Sundr.	Tons	27	110	2970	26	100	2612	2700	270	
Steel Sash	sf	5580	.75	4180	5580	.69	3866	3866	314	
Miscellaneous Iron				1600			116	1600		
				8750			6594	8166	584	
CONCRETE & MASONRY										
Ready-mixed concrete	cy	449	12.70	5700	275	12.10	3332	5433	267	
Brick — common red	M	194	27.60	5360				5360		

a handy and essential record for the construction superintendent and the owner. It is of special value when some operation, either through faulty estimating or unforeseen field conditions, causes costs to rise sharply above those of the original estimate for the work. It is much easier to convince the owner of the need for further expenditure if he is currently advised of field difficulties as they occur.

Although the current and to-date man-hours do not show in the weekly labor-cost statement, Table V, this feature is probably the most worthwhile function of the cost system described. It seems obvious that if the work per unit operation can be resolved into man-hours (actual working hours) for a complete job, that this information can be readily applied to the cost estimating of similar new work both in terms of unit costs and progress time.

Occasionally, during the construction, it may become necessary to know the actual status of the material-purchase costs. The form shown in Table VI will be effective.

Although none of the forms shown in this article are exact copies of those now in use by any known concern, the author is indebted for many of the ideas incorporated in them to the Morton C. Tuttle Co. and E. B. Badger & Sons Co. of Boston, H. K. Ferguson Co. of Cleveland and the M. W. Kellogg Co., New York City.

Drilling Water-Service Connections

J. R. Sullivan
Woodstock, Ontario.

A new method of drilling horizontally to install water services has been developed by the Public Utilities Commission, Woodstock, Ontario, using an air compressor, air drill and water pressure. Other requirements for this work are: sump pump, angle-iron platform to carry the drill on the ditch bottom, and opening 7-ft. trenches across the water main and at the curb box.

The procedure is as follows: Excavate trenches, drill and tap the main, insert corporation cock, install platform and air drill in ditch so that a straight line will be bored to the opposite trench and connect the drill to the corporation cock with a hose.

The reversible air drill with a tapered socket operates at 160 rpm. at 3.7 bhp. under 90 psi. of air. It is equipped with a rolling throttle to govern forward and backward speeds as desired.

The water supply lubricates the drill path and washes borings back through the hole. If the drill encounters a stone, the water spray may loosen sufficient material so that the rock may be forced to one side of the auger. At times, however, it has been necessary to start a new hole.

The twist drill was made from a piece of carbon steel 3-in. wide, $\frac{1}{2}$-in. thick and 9-in. long. It was given a one-quarter turn and sharpened as shown in Fig. 1. The cutting edges of the drill were reinforced by an electrically applied toolweld.

The drill shaft is made up of $1\frac{1}{2}$-in. heavy pipe cut in 4-ft. lengths. Male and female ends are threaded to permit rapid assembly and dis-assembly.

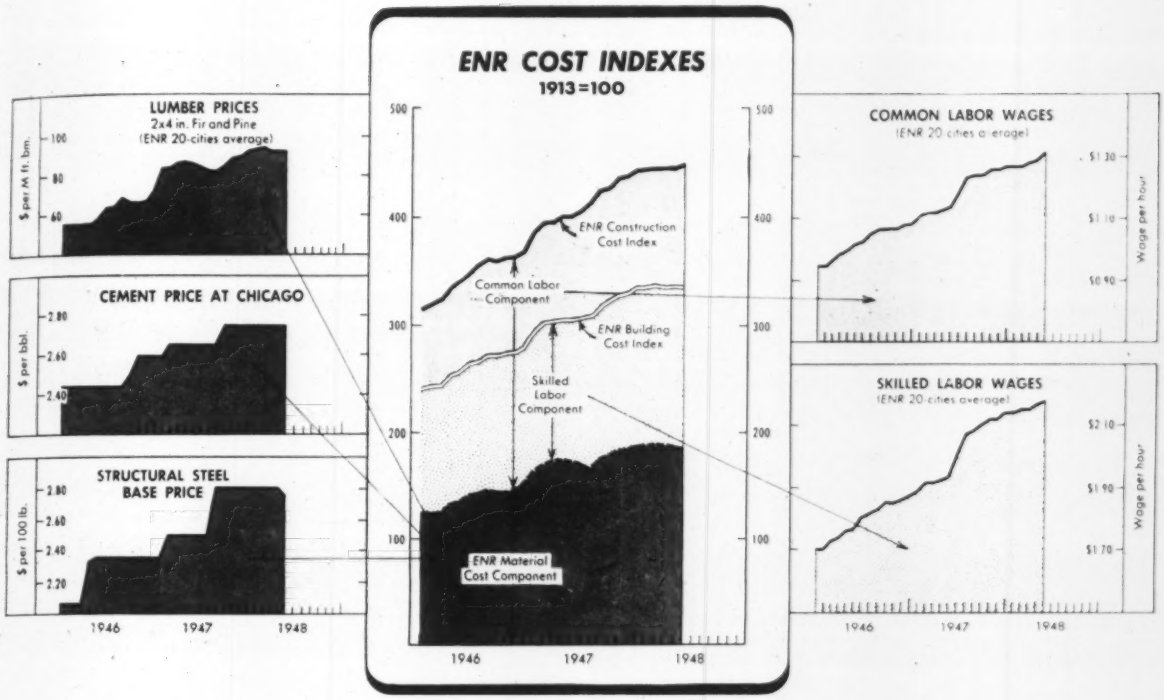
When in operation, the drill is moved forward by a forked lever set in holes along the drill platform and bearing against the frame of the air-motor.

After the hole has been bored, copper pipe attached to the drill shaft by a universal coupling is drawn back to the main.

The pipe shaft, air drill and platform, hose and miscellaneous tools are carried in a trailer attached to the mobile compressor.

Fig. 1. Water-service connections are installed in horizontal holes drilled by an air-motor powered auger.

Fig. 2. The air-powered drill operates from a trench over the water main. . . .



HIGHLIGHTS OF...

Construction Costs - 1948

The steep two-year climb in construction costs that moved the *Engineering News-Record* indexes steadily up at an average rate of 3 to 6 points per month in 1946 and 1947, leveled off to less than 1.5 points for the first five months of 1948. The *Engineering News-Record* Construction Cost Index, on the basis of 1913 as 100, measuring material price and wage rate trends, rose to 441.13 in December, 1947 from 369.30 in the corresponding month of 1946, a gain of nearly 20 percent, then moved on up to 447.86 by May 1948, a rise of less than 2 percent over 1947.

The *Engineering News-Record* Building Cost Index showed a similar trend, rising 19 percent from the December 1946 index of 279.97 to 333.06 in December 1947, then on to 333.93 by May 1948.

A construction "buyer's strike," ascribed to high costs, was effective in the second and third quarters of 1947, in pulling dollar volume of private construction through July down 9 percent below the corresponding dollar volume in 1946. But, by December, it was up again, a little better than even with the 1946 volume for the year. Total heavy engineering construction volume measured in dollars topped 1946 by 9 percent. But due to the higher costs this 9 percent higher dollar expenditure bought 9 percent less physical volume.

The *Engineering News-Record* volume index, which adjusts for construction costs changes, dropped to 228 in 1947 from 248 in 1946, or 9 percent. The first four months of 1948 show a dollar volume increase of 27 percent and a physical volume increase of 12 percent over 1947.

Of the three basic construction materials, steel, lumber and cement, lumber showed the greatest price rise during 1947. Wholesale lumber prices, as measured by *Engineering News-Record's* 20-cities average, rose 29 percent from December 1946 to December 1947. The May 1948 average, however, showed a drop of 0.6 percent from the December 1947 average. The base price of structural steel rose 19 percent to $2.80 per cwt. at the end of 1947 from $2.35 in the preceding year, but declined to $2.75, or 1.8 percent, in May 1948. Cement prices rose 6 percent and remained unchanged through May 1948.

The wages of common and skilled construction labor rose 17 to 15 percent, respectively, during 1947, according to *Engineering News-Record's* 20-cities average. Straight-time common wage average, which is the labor component of the *Engineering News-Record* Construction Cost Index, rose to $1.272 per hour at the end of 1947 from $1.085 in the preceding year. Skilled wage average, the labor component of the Building Cost Index, rose to $2.140 per hour in December 1947 from $1.867 in December 1946. In contrast to the declines evident in the base price of steel and in wholesale lumber prices from December 1947 to May 1948, the wages of common and skilled labor continued to rise during 1948 to $1.315 and $2.180 per hour.

ENR Construction and Building Cost Indexes

THE ENGINEERING NEWS-RECORD Construction Cost Index has four components: (1) structural steel shapes, base price x 25 cwt.; (2) cement at Chicago x 6 bbl.; (3) lumber, which until 1935 was 12 x 12 long leaf yellow pine wholesale at New York, and since 1935 is 2 x 4 S4S pine and fir in carload lots. *ENR* 20-cities average x 1.088 M. ft. B.M.; (4) common labor, *ENR* 20-cities average of wage rates in force x 200 hrs.

THE ENGINEERING NEWS-RECORD Building Cost Index differs from the Construction Cost Index only in that the trend of skilled labor is used, *ENR* 20-cities skilled average x 68.38 hrs. The three material components are the same for both indexes.

For data on converting from 1913 = 100 to other bases see page 111.

Reprints of the colored insert charts on Construction and Building Cost Indexes are available from the *Engineering News-Record* editorial offices, 330 West 42nd Street, New York 18, N. Y., as flat unfolded wall charts, $.10 per chart. Lower rates on quantities.

Engineering News-Record CONSTRUCTION Cost Index—1913 = 100, 1903–1930

Yearly Aver. 1903 '14			1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	
		J	89.22	87.12	112.66	167.75	184.51	198.05	206.55	230.87	168.72	191.70	217.90	210.40	207.15	211.50	203.90	209.40	208.96	J
1903	93.90	F	89.22	87.36	116.66	167.75	184.51	201.50	225.10	230.67	168.72	197.40	220.30	209.70	206.55	210.15	204.65	210.40	206.46	F
1904	87.40	M	88.97	87.66	125.16	175.66	184.51	198.05	240.85	224.27	162.04	205.25	224.70	210.20	207.65	208.80	204.65	207.78	206.80	M
1905	90.55	A	87.97	90.16	129.51	183.41	186.01	191.25	265.20	213.07	164.72	213.50	221.60	209.55	207.05	209.00	206.40	203.40	207.12	A
1906	95.10	M	88.62	90.16	131.06	187.61	186.01	191.25	268.90	210.82	164.62	216.70	222.38	207.20	207.30	206.80	207.00	205.15	205.86	M
1907	100.55	J	87.87	88.96	128.71	199.26	186.31	191.85	273.80	209.82	166.62	220.70	216.85	204.60	204.80	205.55	206.15	205.65	203.36	J
1908	97.20	J	88.12	90.51	127.96	204.01	188.65	193.65	265.65	203.82	169.70	222.10	214.40	204.60	207.80	203.68	206.65	204.77	200.95	J
1909	90.92	A	90.11	91.76	128.76	198.41	193.85	196.65	252.00	193.47	173.40	221.50	213.15	204.60	208.30	205.50	207.29	205.91	200.95	A
1910	96.33	S	90.36	93.01	131.76	190.31	193.85	202.85	255.20	188.27	185.00	221.50	211.25	202.10	208.30	203.60	207.29	207.57	199.58	S
1911	93.43	O	88.51	96.16	135.11	167.11	193.85	202.25	255.20	182.57	188.60	220.30	207.55	205.35	209.80	204.40	207.71	206.32	198.72	O
1912	90.70	N	87.26	101.06	138.16	166.51	193.55	206.85	255.32	166.32	188.60	220.90	205.70	205.95	210.80	201.98	209.46	208.46	198.54	N
1913	100.00	D	86.51	107.06	149.41	167.11	194.75	206.85	251.62	167.82	192.60	217.90	208.58	205.95	210.80	203.90	210.16	209.46	196.86	D
		Aver.	88.56	92.58	129.58	181.24	189.20	198.42	251.28	201.82	174.45	214.12	215.36	206.68	208.03	206.24	206.78	207.02	202.85	Aver.

Engineering News-Record CONSTRUCTION Cost Index—1913 = 100, 1931–1947

	1931	1932	1933	1934	1935†	1936†	1937†	1938†	1939†	1940†	1941†	1942†	1943†	1944†	1945†	1946†	1947†a	1948†a
J	194.48	162.48	158.44	191.26	198.22	201.23	221.20	239.62	234.72	238.34	249.69	267.63	283.45	294.57	302.50	316.32	386.97	441.65
F	196.61	161.82	159.30	194.06	195.07	201.33	222.05	238.99	234.31	238.32	250.50	269.41	283.48	295.05	303.70	319.52	393.73	442.67
M	194.51	157.24	158.44	194.06	194.41	201.63	224.75	238.79	234.43	238.29	250.71	269.71	285.24	295.34	304.50	323.83	395.45	443.60
A	191.63	153.12	160.16	195.86	194.65	202.80	231.35	237.95	234.86	238.26	252.40	271.78	288.80	297.70	306.43	334.59	399.56	443.04
M	189.33	152.78	164.39	199.61	193.96	204.05	233.45	236.80	234.69	238.86	255.55	272.30	289.87	298.00	307.43	340.50	399.98	447.86
J	187.23	152.20	163.41	199.61	196.73	205.08	237.25	236.86	235.02	241.59	256.79	274.19	289.94	298.72	308.99	348.72	406.63	.....
J	174.37	153.36	165.50	199.65	197.43	204.80	239.90	232.29	234.94	242.15	258.18	277.65	289.92	299.94	308.99	354.70	413.75	.....
A	171.38	156.80	167.00	198.40	197.45	208.48	240.65	232.39	234.90	242.18	260.41	281.61	291.38	300.42	309.08	361.37	422.85	.....
S	171.40	157.96	175.48	200.58	197.30	208.88	241.62	232.70	234.97	244.13	263.12	281.61	294.09	300.46	309.28	360.19	426.38	.....
O	169.78	159.16	187.74	200.86	197.50	211.53	241.90	234.30	236.86	245.02	264.46	282.44	294.31	301.06	309.28	360.94	434.58	.....
N	169.28	158.20	190.14	201.36	197.35	211.50	241.40	234.40	238.20	247.24	266.13	283.64	294.41	301.09	309.28	362.47	436.91	.....
D	166.23	158.46	192.14	201.86	197.20	215.70	241.05	234.89	238.17	249.12	266.16	283.69	294.51	302.30	313.48	a369.30	441.13	.....
Aver.	181.35	156.97	170.18	198.10	196.44	206.42	234.71	235.83	235.51	241.96	257.84	276.31	289.95	298.72	307.75	a346.04	413.16	.....

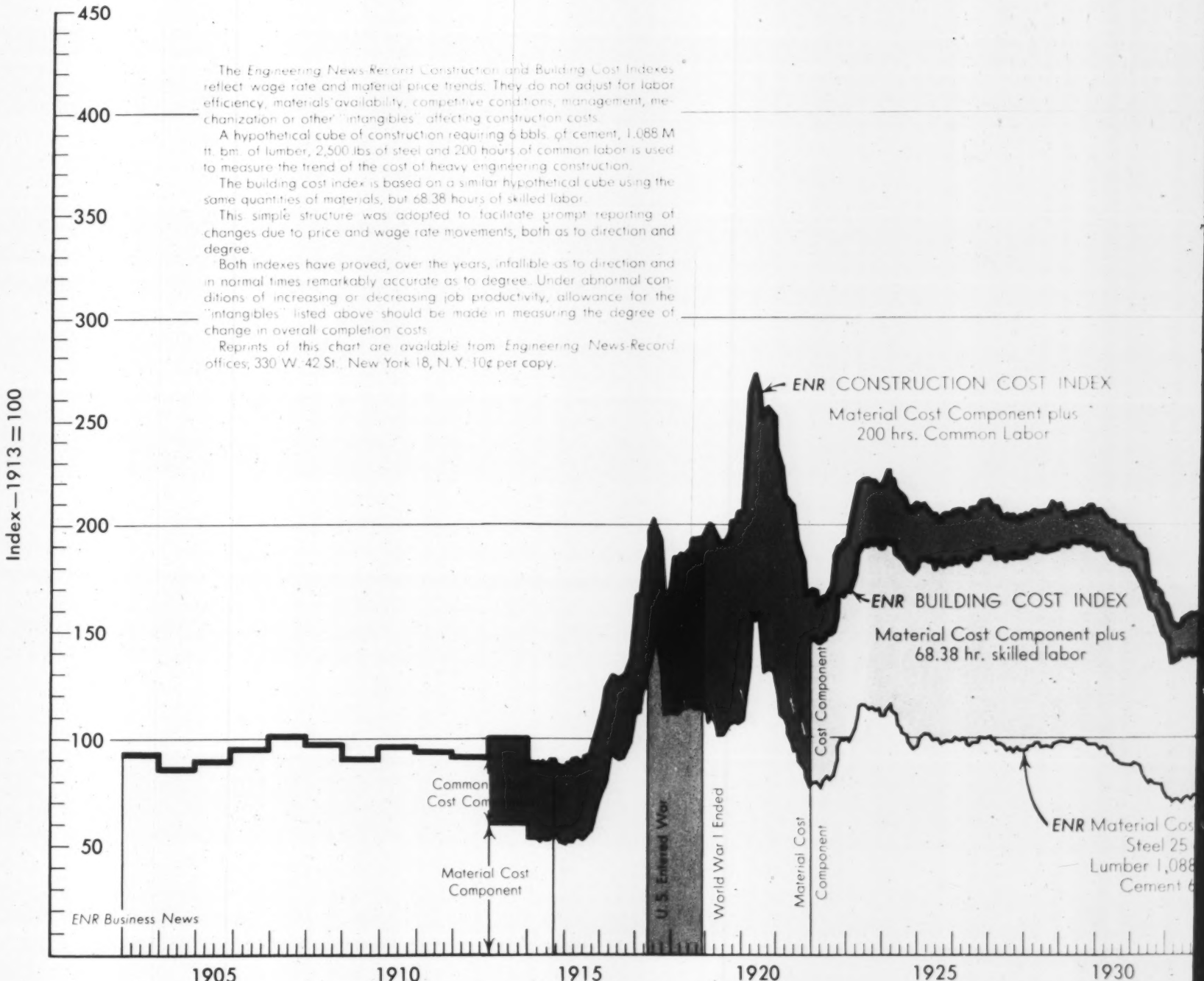
Engineering News-Record BUILDING Cost Index—1913 = 100, 1910–1947

Yearly Aver. 1910 '23			1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935†	1936†	1937†	1938†	1939†	1940†	1941†	1942†	1943†	1944†	1945†	1946†	1947†a	1948†a
1910	96.4	J	189.3	182.7	184.3	187.8	185.9	190.0	190.3	180.7	150.6	140.8	160.2	166.5	168.3	185.5	198.6	196.2	201.5	207.9	217.1	226.9	231.6	236.5	242.2	294.6	333.6
1911	94.1	F	191.7	184.5	183.7	189.2	187.2	190.0	188.4	182.0	147.2	141.7	161.3	165.8	168.4	186.6	199.0	196.2	201.5	208.4	218.4	226.9	232.0	237.7	243.9	301.6	335.5
1912	91.4	M	194.1	184.5	184.3	187.3	187.2	190.0	189.2	180.2	145.9	140.8	161.7	164.1	169.7	187.7	199.3	196.5	201.5	207.9	218.9	226.7	232.3	237.9	245.4	303.3	334.2
1913	100.0	A	191.8	184.7	184.1	186.0	188.8	190.0	188.8	177.6	135.7	141.5	163.2	164.4	170.0	195.0	198.2	196.5	201.4	208.6	219.6	227.5	234.5	238.5	254.4	305.2	334.6
1914	91.9	M	192.5	182.8	183.6	185.4	190.1	191.3	187.9	174.6	136.4	143.9	168.2	163.3	170.3	197.2	197.9	196.6	201.2	209.2	220.1	227.6	234.8	238.5	258.1	304.6	333.9
1915	95.3	J	187.7	183.0	181.8	185.8	187.6	192.0	185.4	172.5	137.6	143.2	168.2	164.9	170.2	199.2	198.2	196.4	201.7	209.4	221.2	227.7	235.3	239.4	265.3	307.4	.....
1916	130.9	J	184.5	180.2	184.3	183.9	187.6	192.0	183.3	170.5	139.5	144.3	169.2	165.3	170.9	199.8	194.4	196.8	201.7	210.2	223.5	227.9	235.6	239.6	267.3	308.9	.....
1917	166.8	A	183.3	183.0	185.1	186.5	187.6	192.8	183.7	163.1	139.4	145.9	168.4	166.2	173.9	200.7	194.5	196.5	201.7	212.5	225.4	228.5	236.1	239.9	272.3	317.8	.....
1918	159.1	S	181.4	180.5	185.1	184.6	187.6	191.6	182.4	159.5	139.6	154.5	170.1	166.1	174.3	200.6	194.8	196.6	203.1	214.6	225.5	231.2	236.0	240.1	272.4	322.6	.....
1919	158.8	O	178.4	181.8	188.0	186.6	187.6	190.3	181.8	159.5	140.0	157.1	170.2	167.3	175.3	201.0	195.5	198.5	204.0	215.9	225.9	231.3	236.0	240.4	273.0	327.3	.....
1920	207.2	N	176.5	182.4	188.0	185.0	188.0	190.3	181.8	158.3	139.5	159.0	170.2	167.3	175.5	200.3	195.6	201.2	206.2	216.5	226.6	231.4	236.1	240.5	274.0	329.2	.....
1921	166.1	D	178.4	183.1	188.0	185.1	190.0	190.3	181.8	155.0	140.0	160.7	170.2	167.2	179.3	200.5	196.1	201.2	208.2	216.4	226.6	231.5	236.5	240.8	a280.0	333.1	.....
1922	154.9																										
1923	186.0	Aver.	185.8	182.7	185.0	186.1	188.0	190.9	185.4	169.4	140.9	147.8	166.7	165.8	172.2	196.2	196.8	197.4	202.8	211.5	222.4	228.8	234.7	239.1	a262.35	313.0	....

† Based on 2 x 4 S4S fir and pine *ENR* 20-cities average lumber component instead of 12 x 12 yellow pine wholesale in New York used prior to 1935. For explanation see page C-5 of June 30, 1938 *ENR*. a Revised.

ENGINEERING NEWS-RECORD CONSTRUCTION AN

(1913=100)


450
400
350
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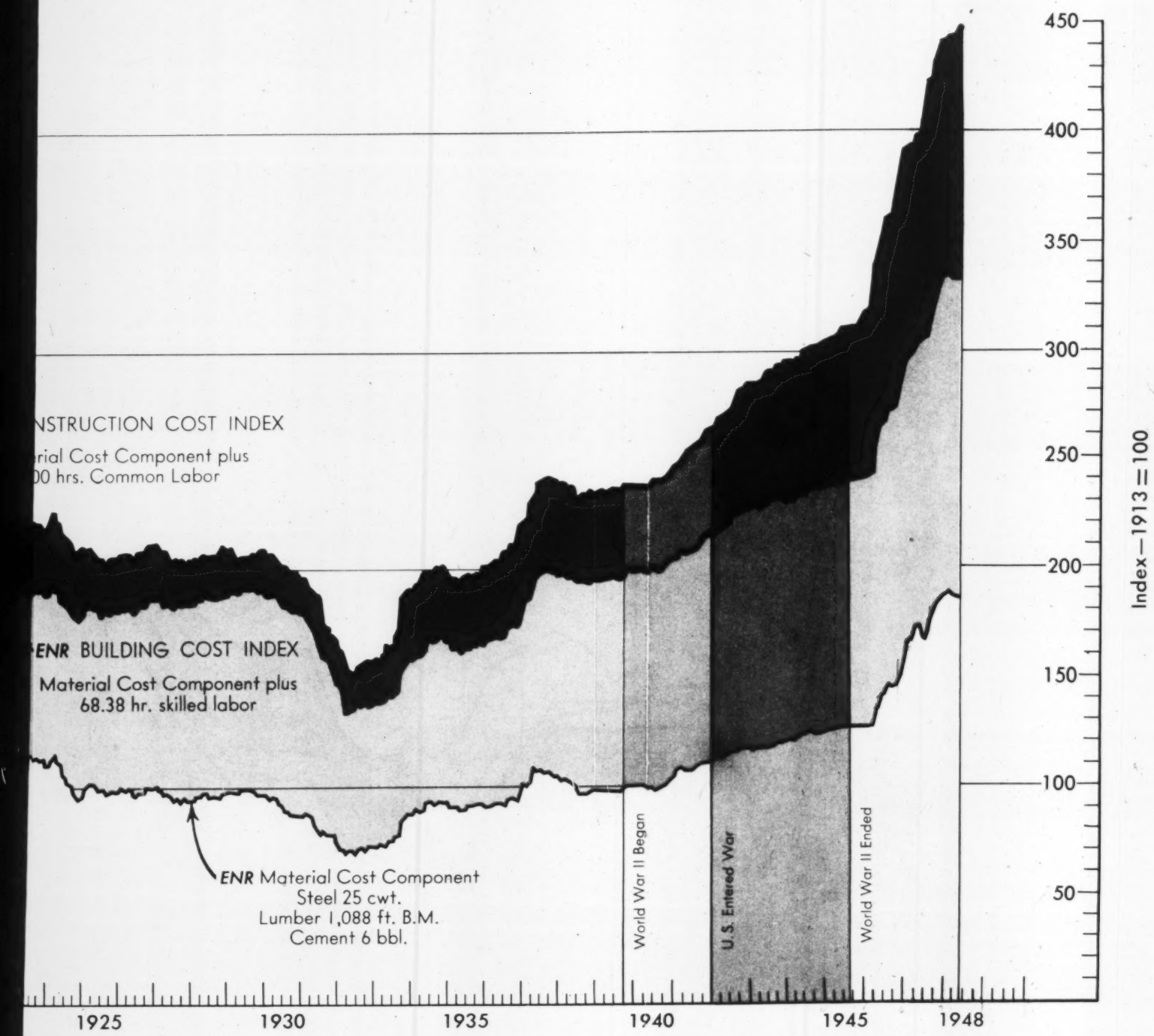
50
Index—1913 = 100
The Engineering News-Record Construction and Building Cost Indexes reflect wage rate and material price trends. They do not adjust for labor efficiency, materials availability, competitive conditions, management, mechanization or other "intangibles" affecting construction costs.
A hypothetical cube of construction requiring 6 bbls. of cement, 1,088 M ft. bm. of lumber, 2,500 lbs of steel and 200 hours of common labor is used to measure the trend of the cost of heavy engineering construction.
The building cost index is based on a similar hypothetical cube using the same quantities of materials, but 68.38 hours of skilled labor.
This simple structure was adopted to facilitate prompt reporting of changes due to price and wage rate movements, both as to direction and degree.
Both indexes have proved, over the years, infallible as to direction and in normal times remarkably accurate as to degree. Under abnormal conditions of increasing or decreasing job productivity, allowance for the "intangibles" listed above should be made in measuring the degree of change in overall completion costs.
Reprints of this chart are available from Engineering News-Record offices; 330 W. 42 St., New York 18, N.Y. 10¢ per copy.
ENR CONSTRUCTION COST INDEX
Material Cost Component plus
200 hrs. Common Labor
ENR BUILDING COST INDEX
Material Cost Component plus
68.38 hr. skilled labor
Common
Cost Com
Material Cost
Component
U.S. Entered War
World War I Ended
Material Cost
Component
Cost Component
ENR Material Cos
Steel 25
Lumber 1,088
Cement 6
ENR Business News
1905
1910
1915
1920
1925
1930

ISTRUCTION AND BUILDING COST INDEXES

(1913=100)



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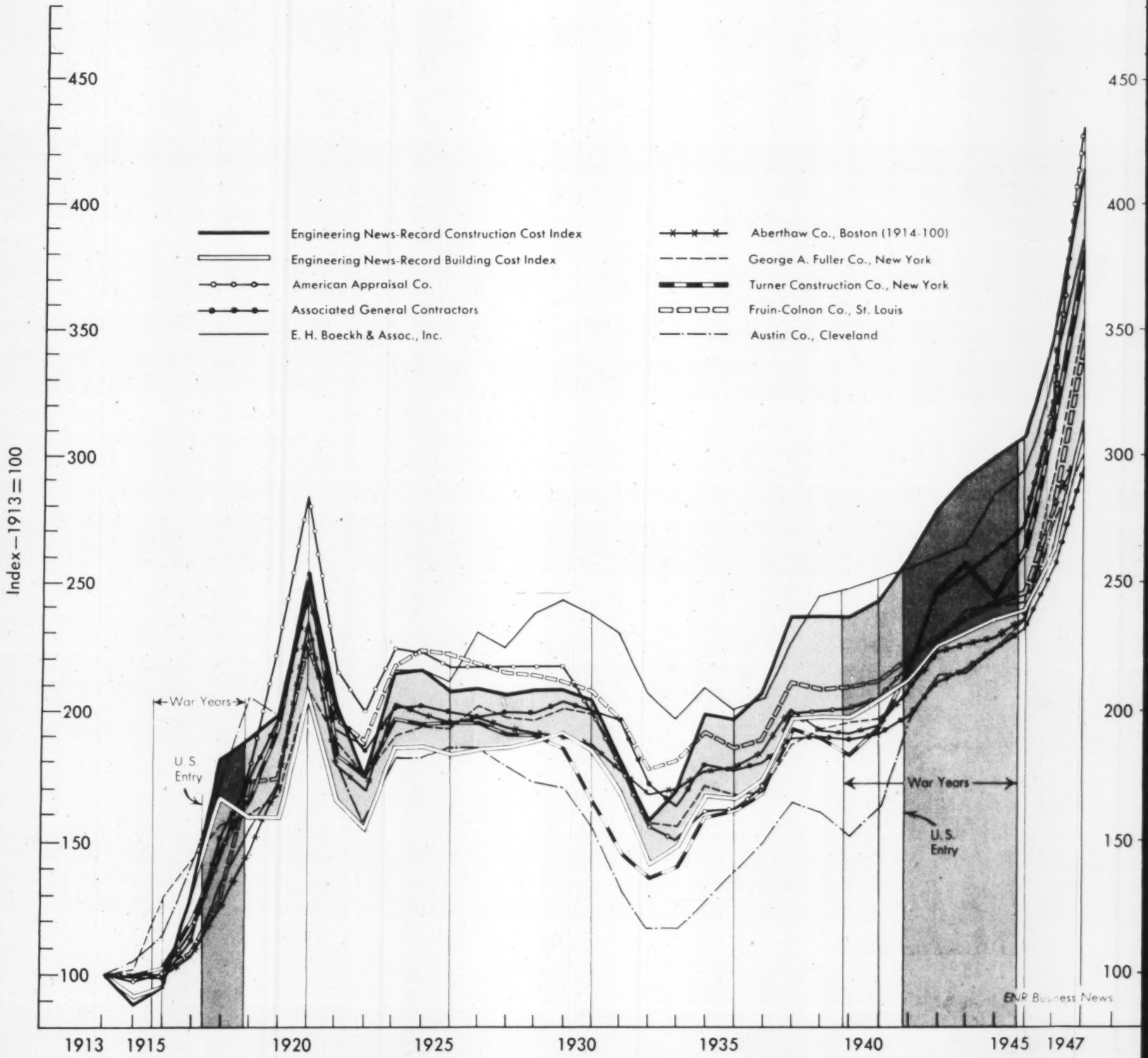
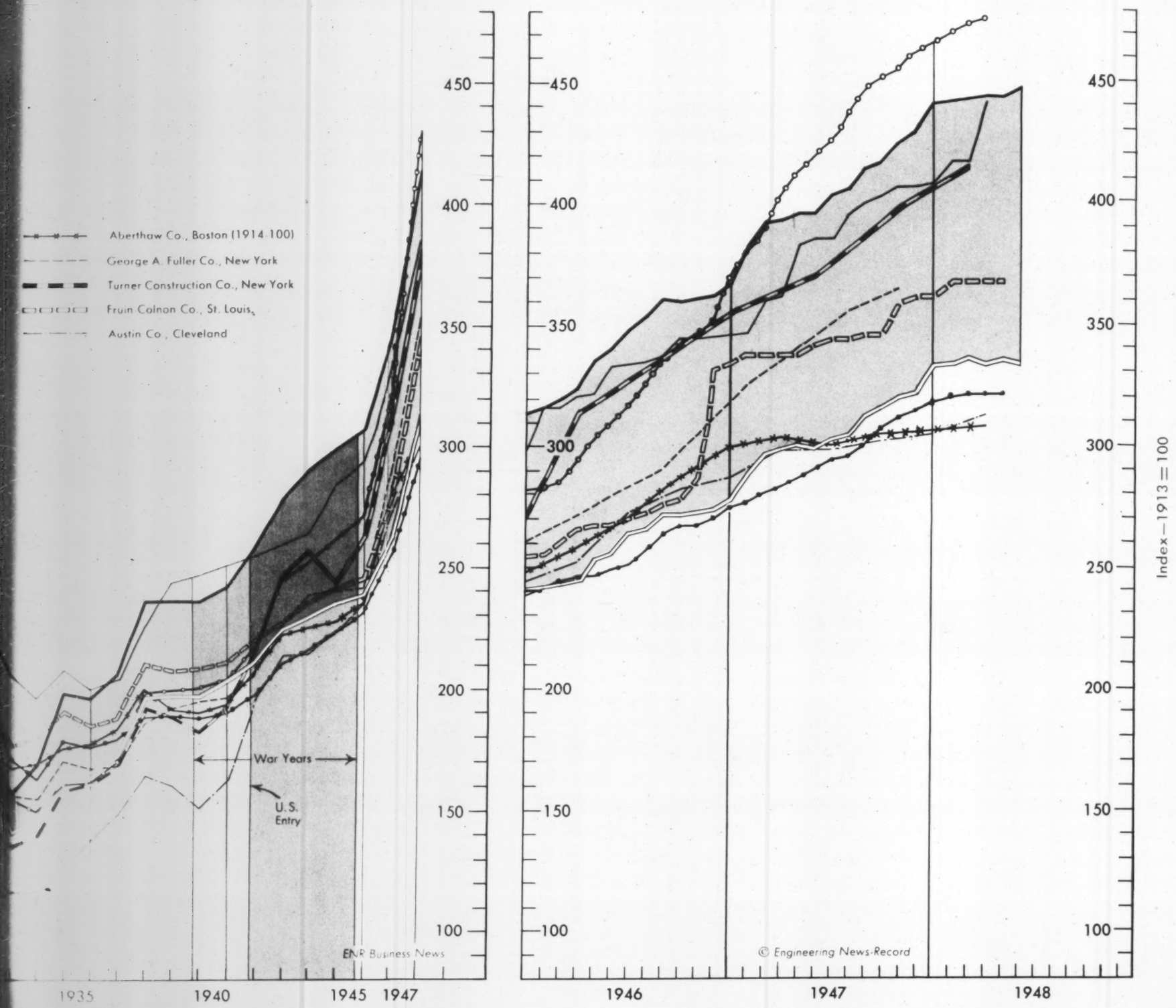
COMPARISON OF BUILDING AND CONSTRU

(1913=100)



BUILDING AND CONSTRUCTION COST INDEXES

(1913=100)



Building and Construction Cost Indexes

Composition and historical review of twelve construction and building cost indexes

ENGINEERING NEWS-RECORD CONSTRUCTION COST (ENR Const.) Structural steel shapes, base price x 25 cwt.; cement at Chicago x 6 bbl.; lumber 2x4 S4S pine and fir in carload lots, ENR 20-cities average x 1.088 M.ft.B.M.; common labor, ENR 20-cities average, x 200 hrs. Base: 1913 = 100. See pages 108, 111.

ENGINEERING NEWS-RECORD BUILDING COST (ENR Bldg.)—Structural steel shapes, base price x 25 cwt.; cement at Chicago x 6 bbl.; lumber 2x4 S4S pine and fir in carload lots, ENR 20-cities average x 1.088 M.ft.B.M.; skilled labor, ENR 20-cities average, x 68.38 hrs. 1913 = 100.

AMERICAN APPRAISAL COMPANY (AAC)—Average for 30 cities of four types of buildings: wood frame, brick-wood frame, brick-steel frame, reinforced concrete. Mechanicals not included. Based on actual appraisal costs. Available for individual cities (see page 113). Includes adjustments for social security taxes, unemployment insurance and corresponding "overhead". Base: 1913 = 100.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA (AGC)—Wages and materials for 12 cities combined in 40-60 ratio. Wages, prevailing rates for hod carriers and common labor. Materials, weighted: sand, gravel and crushed stone, 1; cement, 1; lumber, 1; hollow tile, ½; structural and reinforcing steel, ½. Base: 1913=100.

E. H. BOECKH & ASSOC., INC.—Individual series for ten types of buildings for sixteen areas. Weights based on studies of actual building costs—vary with different type of structures. Material prices are those paid by contractors to material dealers. Prevailing skilled and common wage rates from contractors. Base: United States average, 1926-29=100. Series given here is brick and concrete, New York, converted to 1913=100 base. For further definition see page 117.

HANDY PUBLIC UTILITY CONSTRUCTION COST—Compiled and published Jan. 1 and July 1 of each year by Whitman, Requardt and Associates and Benjamin L. Smith & Associates. (See page 119) Individual series for 81 cost elements in three classes of utility construction, for five geographic divisions of United States.

Weighting based on wide experience in cost analysis of plant and construction. Material prices from Engineering News-Record, Iron Age and various manufacturers. Labor rates from Utilities, Unions and Builders Associations. Base: 1911-'14 =100. The reinforced concrete building construction series is tabulated in this table.

RAILROAD CONSTRUCTION INDEX (ICC-RR)—Compiled by Engineering Section, Bureau of Valuation, Interstate Commerce Commission. (See page 115). Indexes for road (47 subseries), equipment (8 subseries), and general expenditures (7 subseries), for national average and 8 regional areas. Series quoted here is road, subseries 16, station and office buildings, national average. Computed from analysis of contracts covering major construction projects over 30-year period, and other information furnished by carriers. Base: 1910-14=100.

ABERTHAW—Until March 31, 1946, New England seven-story and basement (62'4"x 202'4"), reinforced concrete building built in 1914, repriced quarterly as a construction bid to duplicate original building. Since March 31, 1946, New England, composite of 36 major cost items in three multistory and two one-story industrial buildings, including all mechanical trades, repriced using actual and estimated labor and material costs. Base: 1914 = 100.

AUSTIN INDUSTRIAL BUILDING COST—Repricing typical one-story, steel frame, monitor type industrial building at regular intervals. Structure has concrete foundations, curtain walls of brick and large areas of steel sash and glass; concrete floor laid on ground; 2-in. lumber roof deck on heavy timber covered with 4-ply waterproofing. Monitor sash equipped with mechanical operators. Pricing at representative points in central and eastern states. Base: 1926=100. Table series converted to 1913 = 100. See also chart page 113.

FRUIN-COLNON—Industrial plant of five buildings in St. Louis repriced on basis of contractor's actual and estimated material and labor costs. Base: 1913=100.

GEORGE A. FULLER COMPANY—Composite of 36 major cost elements, in three commercial type buildings, including mechanicals, elevators, wiring, heating and ventilating, repriced. Base 1913=100.

TURNER CONSTRUCTION COMPANY—Eastern cities. Own building cost experience applied to these factors: labor rates, material prices, productivity of labor, efficiency of plant and management, competitive conditions. Base: 1913=100.

Reprints of the colored insert charts on Construction and Building Cost Indexes are available from the *Engineering News-Record* editorial offices, 330 West 42nd Street, New York 18, N. Y., as flat unfolded wall charts, $.10 per chart. Special rates on larger quantities.

Construction and Building Cost Indexes—1913 through 1947

	Weighted Indexes					Aggregative Indexes						
Year Base = 100	ENR Const. 1913	ENR Bldg. 1913	AAC (New) 1913	AGC 1913	Boeckh New York 1913	Handy R. C. Atl. Seab'd. 1911-'14	ICC-RR Sta. & Off. Bldg. 1910-'14	Aberthaw 1914	Austin Co. 1913	Fruin-Colnon 1913	Fuller 1913	Turner 1913
1913.....	100	100	100	100	100	...	...	...	100	100	100	100
1914.....	89	92	98	99	102	...		100	105	102	102	100
1915.....	93	95	101	100	99	...	101	100	115	102	130	103
1916.....	130	131	116	114	116	153	115	107	141	108	143	120
1917.....	181	167	143	152	135	233	135	126	172	128	156	147
1918.....	189	159	177	175	155	242	154	147	206	173	160	166
1919.....	198	159	229	198	171	237	185	172	198	174	168	196
1920.....	251	207	283	247	230	260	215	234	241	227	209	252
1921.....	202	166	216	200	193	207	192	179	180	197	188	183
1922.....	174	155	200	184	187	165	180	170	157	188	175	175
1923.....	214	186	224	201	215	199	194	202	181	217	190	196
1924.....	215	186	222	202	215	226	193	198	181	223	194	194
1925.....	207	183	217	199	211	219	188	195	185	222	193	195
1926.....	208	185	217	197	230	213	184	197	185	218	202	195
1927.....	206	186	217	200	223	208	189	193	178	214	197	190
1928.....	207	188	217	199	238	205	188	191	172	213	196	190
1929.....	207	191	217	203	242	211	187	190	170	211	201	185
1930.....	203	185	200	200	238	200	182	186	155	207	199	165
1931.....	181	169	178	196	230	184	165	176	131	196	180	145
1932.....	157	141	155	171	208	165	141	168	117	178	157	136
1933.....	170	148	150	163	197	159	145	170	117	181	155	140
1934.....	198	167	161	178	209	186	151	176	128	191	171	160
1935.....	196	166	162	176	200	190	151	177	139	185	167	162
1936.....	206	172	170	179	205	192	157	184	150	188	168	169
1937.....	235	196	198	188	226	208	166	199	165	210	187	192
1938.....	236	197	199	189	243	210	166	191	161	207	192	188
1939.....	236	197	200	188	248	206	166	190	152	208	195	182
1940.....	242	203	204	189	251	210	177	193	163	211	196	194
1941.....	258	211	217	198	255	228	188	207½	198	220	206	217
1942.....	276	222	241	209	260	252	208	223	213	227	229	245
1943.....	290	229	252	216	264	254	219	225	215	235	238	257
1944.....	299	235	261	223	284	257	227	227	223	241	248	244
1945.....	308	239	271	231	294	260	244	236	234	247	241	263
1946.....	346	262	322	257	333	288	291	279	273	285	290	318
1947.....	413	313	430	296	386	345	...	304	301	347	354	380

The more you need

SPACE-ECONOMY, EFFICIENCY and PROTECTION at DOORWAYS

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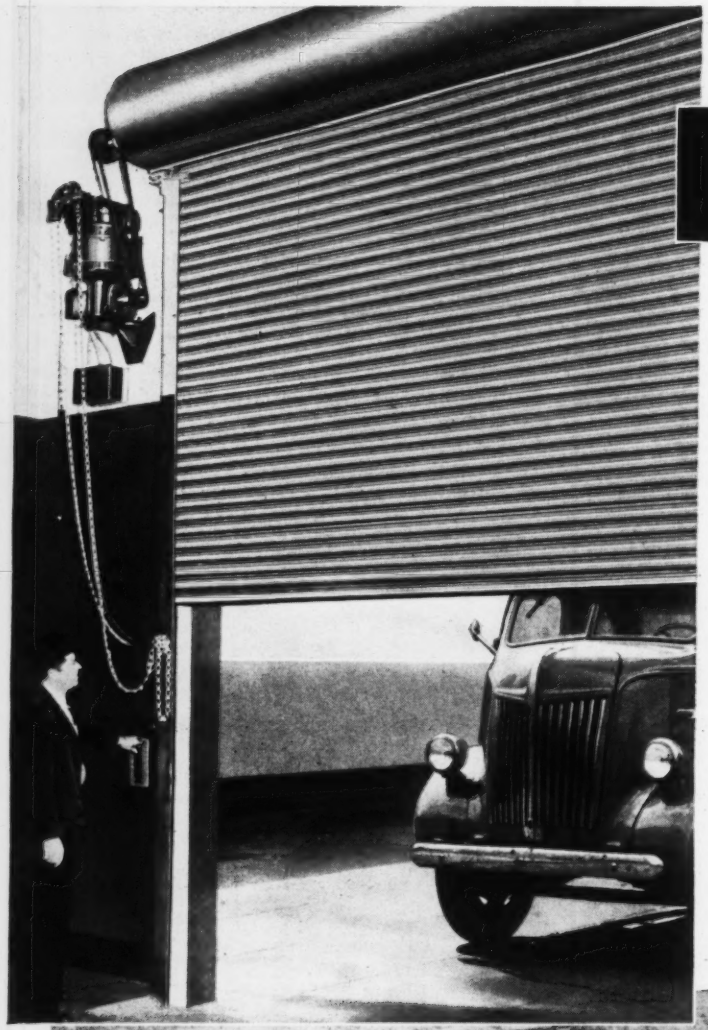

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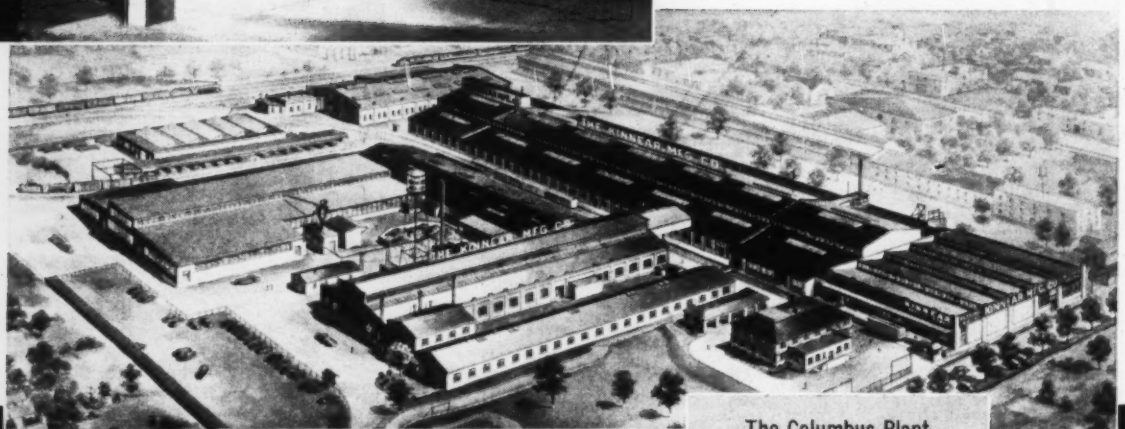

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Other Bases for Engineering News-Record Cost Indexes

For convenience in comparing cost index rises with prewar conditions the *Engineering News-Record* Construction and Building Cost Indexes are given here for three bases 1926 = 100, 1939 = 100 and 1940 = 100. Many postwar projects had their cost estimates based on 1940 price and wage levels with the proviso that these estimates should be adjusted to future postwar conditions in proportion to the rise in the *Engineering News-Record* Cost Indexes. This 1940 = 100 base series will aid in making these adjustments.

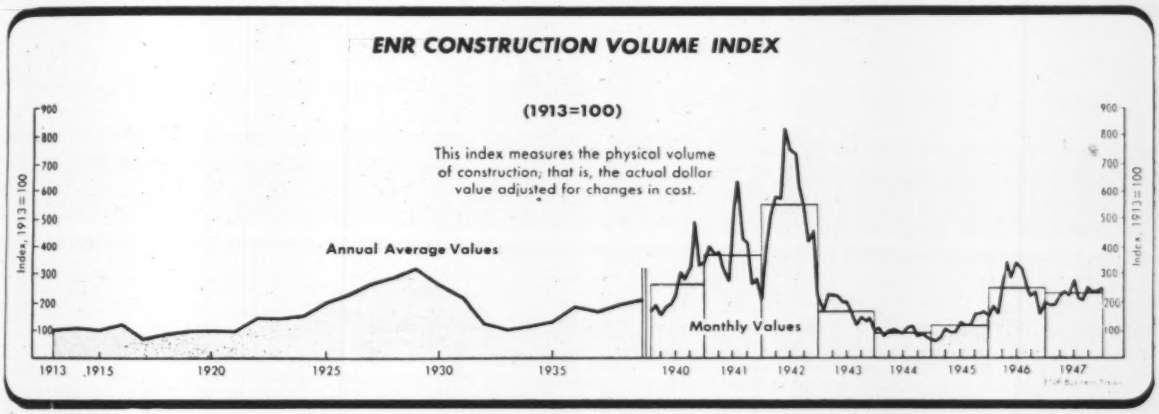
The full historical record of the *Engineering News-Record* Cost Indexes is reported on a preceding page based on 1913 = 100. To convert from this original base year of 1913, on which these indexes are computed, to other bases the accompanying conversion table can be used.

BASE-CONVERSION TABLE

To convert Engineering News-Record Construction and Building Cost Indexes

From Base 1913 = 100 To Base	Divide 1913 = 100 Index Values for Construction Cost Index Divide by	for Building Cost Index Divide by
1940 = 100	2.4196	2.0281
1939 = 100	2.3551	1.9744
1926 = 100	2.0803	1.8499
1929 = 100	2.0702	1.9086
1910–14 = 100	.9380	.9477
1924 = 100	2.1536	1.8578
1923–25 = 100	2.1204	1.8481
1914 = 100	.8856	.9191
1911 = 100	.9343	.9414

Year	ENR Construction Cost Index '26 = 100	'39 = 100	'40 = 100	ENR Building Cost Index '26 = 100	'39 = 100	'40 = 100
BASE						
1926 Aver	100.0	88.3		100.0	93.6	91.2
1927	99.1	87.5	85.9	100.6	94.4	91.7
1928	99.4	87.8	85.2	101.6	95.2	92.6
1929	99.5	87.9	85.4	103.1	96.6	94.1
1930	97.5	86.1	85.5	100.2	93.9	91.4
1931	87.1	77.0	83.8	91.3	85.7	83.5
1932	75.4	66.6	74.9	75.7	71.3	69.4
1933	81.8	72.2	64.8	79.5	74.8	72.8
1934	95.2	84.1	70.3	90.1	84.4	82.1
1935	94.4	83.4	81.8	89.6	83.9	81.7
1936	99.2	87.6	81.8	93.1	87.2	84.9
1937	112.7	99.6	85.3	106.1	99.3	96.7
1938	113.3	100.1	97.0	106.4	99.6	97.0
1939	113.2	100.0	97.4	106.7	100.0	97.3
1940	116.3	102.7	97.3	109.6	102.7	100.0
1941	124.0	109.4	100.0	114.3	107.1	104.2
1942	132.8	117.3	106.5	120.2	112.6	109.6
1943	139.4	123.1	114.1	123.7	115.8	112.8
1944	143.6	126.8	119.8	126.9	118.8	115.7
1945	147.9	130.6	123.4	129.3	121.1	117.8
1946	166.3	146.9	143.0	141.8	132.9	129.4
1947	198.6	175.4	170.8	169.2	158.5	154.3
1948 May	215.3	190.2	185.1	180.5	169.1	164.7



Engineering News-Record Construction Volume Index

As construction costs rise the physical volume of construction materials and labor per dollar invested declines proportionately. The *Engineering News-Record* Construction Volume Index is computed to measure the trend in physical construction. Other construction volume trends are based on dollars invested. For example, April, 1948 construction dollar volume is up 37 percent over April, 1947, whereas the *ENR* Construction Volume Index shows a rise of only 23 percent in physical volume, due to the rise in construction costs in this period.

Engineering News-Record Construction Volume Index — 1913 = 100

	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	'31	'32	'33	'34	'35	'36	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	a '47	a '48
J	71	49	96	69	57	38	138	52	100	151	125	141	198	187	208	325	199	208	121	129	149	131	248	168	172	287	173	402	402	172	114	63	190	192	173
F	83	76	95	47	151	91	130	55	68	129	144	145	187	182	225	378	204	198	105	82	156	75	177	181	189	187	196	374	507	231	86	78	167	195	231
M	142	75	90	55	90	52	113	90	186	162	161	161	240	226	318	382	408	278	97	62	130	101	157	146	188	210	162	386	578	228	103	103	256	218	247
A	113	82	137	65	58	78	134	109	161	186	159	211	233	257	316	332	329	289	135	65	109	130	165	160	176	221	191	322	569	225	106	99	345	245	302
M	155	96	129	50	67	80	126	108	221	149	191	209	254	290	299	395	354	251	149	103	101	107	148	214	167	232	201	275	821	203	100	93	284	222	
J	128	105	129	57	106	129	92	119	178	173	149	214	246	207	308	347	324	243	131	109	119	120	193	246	166	193	225	492	752	204	91	133	343	274	
J	139	129	136	87	107	122	83	115	146	151	161	178	248	252	266	320	226	248	166	65	128	95	187	187	207	166	308	635	736	175	114	119	311	218	
A	118	126	130	63	111	135	86	116	137	100	162	266	252	306	306	290	259	187	111	73	94	138	197	152	215	228	281	434	622	119	121	119	258	211	
S	96	116	145	166	145	113	80	109	149	166	159	262	227	273	296	340	232	225	124	122	101	125	201	150	213	190	324	419	544	155	85	164	223	250	
O	108	101	97	87	67	207	79	130	154	154	164	233	244	269	363	273	211	229	137	162	98	159	189	167	217	222	490	263	421	142	91	167	233	228	
N	84	150	105	76	66	71	57	106	114	121	128	194	211	272	251	245	207	180	137	133	115	169	163	148	199	219	331	282	462	149	74	173	164	234	
D	62	89	106	49	27	41	63	117	134	123	145	206	188	319	244	166	192	133	113	116	105	252	208	143	249	172	344	217	227	193	66	163	a206	246	
Av	107	100	119	67	86	98	99	96	147	146	154	201	228	263	287	317	260	220	127	102	114	134	185	172	197	211	269	375	553	176	96	123	248	228	

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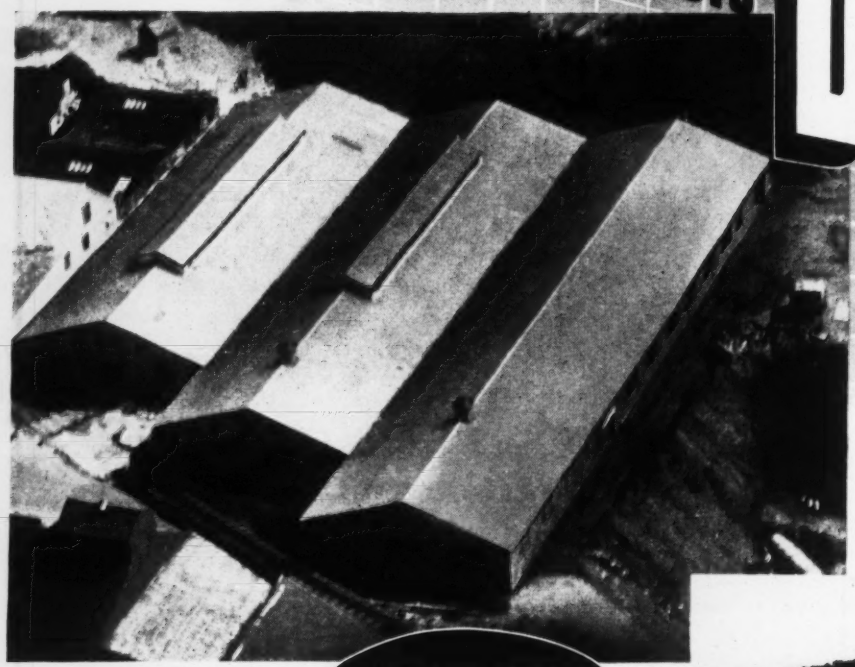

IDECO Steel Buildings added 39,600 square feet of production space to this pottery in less than 90 days, with 10 men and no overtime. Steel erection (below) was completed in 920 man-hours. Completed building has 130 windows, 9 doors.

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INDUSTRIAL STEEL BUILDINGS

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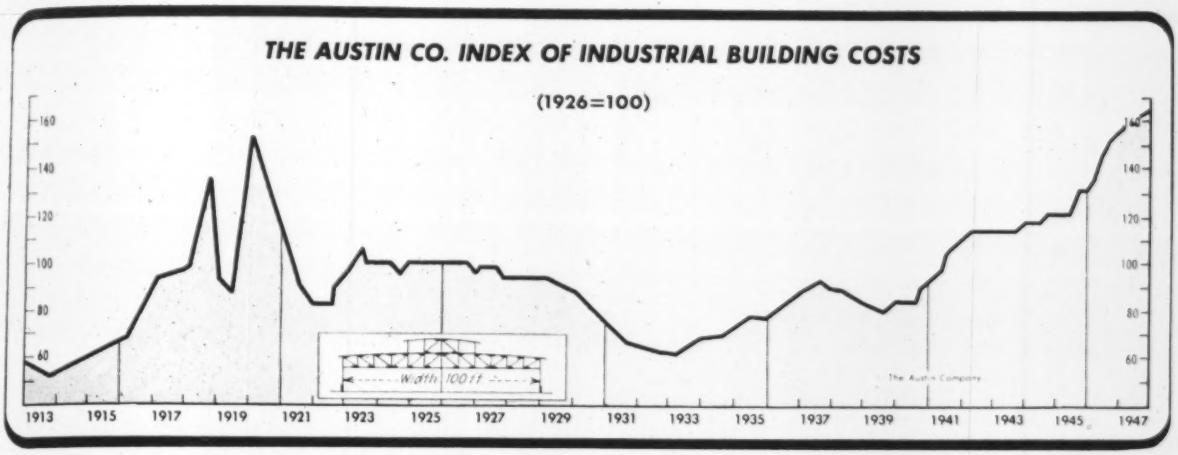


American Appraisal Company Construction Cost Trend Index — 1913 = 100

For average of four types of buildings: All Frame, Brick-Wood Frame, Brick-Steel Frame and Reinforced Concrete. These indices cover structural items only, and do not include factors for Plumbing, Heating, Lighting, Elevators, etc.

	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30	'31	'32	'33	'34	'35	'36	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47
U. S. AVER.	98	101	116	143	177	229	283	216	200	224	222	217	217	217	217	217	200	178	155	150	161	162	170	198	199	200	204	218	241	252	261	271	322	430
	24 Cities																			30 Cities														
Boston	100	103	118	149	183	234	288	220	209	232	229	224	224	222	222	224	212	195	169	163	170	169	178	212	209	210	214	225	248	254	260	270	320	420
New York	99	100	115	142	175	227	299	245	219	245	241	230	234	234	235	237	219	201	170	167	176	174	182	213	216	219	223	233	248	254	265	272	327	441
Buffalo	98	99	115	144	180	232	278	214	197	228	225	218	219	217	213	212	195	178	157	150	160	158	165	202	206	205	207	221	247	256	270	279	328	440
Baltimore	97	99	116	150	193	239	289	215	206	233	229	226	224	226	227	228	211	186	166	158	167	173	180	200	200	198	200	220	248	256	265	277	335	445
Philadelphia	98	102	115	145	181	236	300	220	201	232	230	224	225	228	227	227	209	190	161	156	166	166	171	193	194	196	207	225	247	254	263	273	317	417
Pittsburgh	97	99	115	142	179	231	290	221	201	228	238	233	236	237	236	236	217	198	172	161	170	168	177	211	219	219	219	225	249	259	266	279	325	424
Cincinnati	99	100	115	143	173	217	276	211	194	221	221	219	217	219	219	220	202	176	157	151	161	162	174	206	209	209	213	223	242	250	266	272	317	422
Cleveland	97	99	120	149	179	233	303	227	210	241	243	236	233	231	232	232	213	188	160	151	164	168	175	208	207	206	209	224	245	249	258	268	319	431
Chicago	97	100	116	141	170	224	294	226	202	228	225	224	219	222	222	222	205	185	162	156	166	169	179	204	205	205	207	216	235	244	250	260	303	404
Indianapolis	102	104	119	146	175	221	279	221	202	225	227	222	219	222	224	224	206	182	157	150	161	161	169	199	204	205	209	233	247	257	266	276	327	440
Detroit	99	102	122	150	187	244	304	220	200	229	227	226	224	222	221	220	202	174	148	146	157	160	168	203	205	207	212	226	252	259	268	278	335	441
Milwaukee	100	103	120	150	178	237	290	212	195	224	224	217	218	219	220	218	197	163	144	141	156	163	178	208	208	209	213	225	254	264	269	280	328	437
Minneapolis	98	100	114	142	171	218	277	210	193	214	208	201	197	197	197	198	182	165	148	146	154	154	162	199	201	202	207	214	235	241	251	266	310	401
Kansas City	98	102	120	150	184	239	280	220	211	231	228	220	220	215	213	213	193	178	156	149	160	162	169	202	209	209	211	221	239	249	256	268	321	420
St. Louis	97	100	114	141	175	228	284	225	204	228	238	233	230	226	225	224	205	188	163	156	166	164	171	207	207	207	211	220	238	245	253	265	314	422
Atlanta	97	98	111	140	186	250	304	218	202	226	217	209	211	214	215	215	195	173	147	142	162	163	170	192	185	187	193	215	240	257	267	278	344	457
Dallas	100	105	121	145	176	227	274	209	191	209	206	198	204	204	202	202	*87	168	146	139	149	148	154	170	168	171	173	187	209	224	236	246	291	397
New Orleans	97	96	113	136	174	239	282	217	201	225	227	216	217	218	215	215	198	170	145	141	159	159	166	186	187	194	202	214	234	244	259	277	324	429
Denver	100	102	118	145	171	216	262	206	191	202	206	204	204	202	205	207	189	168	149	141	150	151	157	190	193	195	199	209	226	233	237	245	297	393
Seattle	96	101	115	141	176	224	268	197	186	207	206	201	199	195	194	198	184	159	141	136	150	154	161	194	193	195	200	219	244	255	267	277	324	443
San Francisco	97	104	118	139	169	214	258	204	189	208	199	194	188	188	188	190	177	158	144	138	145	144	155	178	176	180	181	201	225	232	237	244	297	401
Los Angeles	97	102	112	133	162	213	251	208	199	213	204	197	195	193	193	196	178	157	141	134	142	140	143	165	166	167	166	183	213	236	240	249	307	422

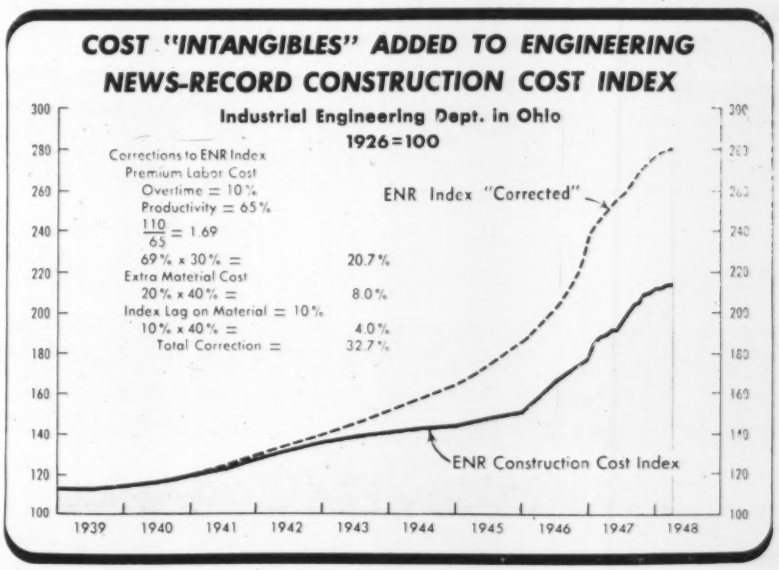
NOTE — These construction cost index figures are based on 1913 as 100% for each individual location, thus indicating the trend in each city and not the trend between the various locations. The index figures are calculated on the basis of normal average material prices, average labor wages, and the market conditions in the individual cities and do not reflect extremes such as premium prices and overtime wages for rush work during boom periods or the "extreme low" of cut-throat practices during the "depression periods."

Method Developed to Compare "Actual" Cost Trend with "Theoretical"

An Industrial Engineering Department in Ohio has computed a "corrected" index, based on the *Engineering News-Record* Construction Cost Index adjusted to suit conditions which prevail on current construction work.

Engineering News-Record Construction Cost Index measures wage rate and material price trends and does not correct for labor efficiency, competitive conditions, management, mechanization or other "intangibles" affecting construction costs.

This "corrected" index is adjusted for productivity, increases in actual labor rates paid, as compared with published rates, due to overtime, and added material costs due to substitutions that must be made.



STRUCTURAL TIE-RODS

Bethlehem Structural Tie-Rods are made of new billet steel to ASTM Specification A-7, and are furnished in all sizes up to 4½ in. thread diameter. They come either plain or upset, in single units up to 46 ft long, and in multiple units of any length. They have either cut or rolled right- or left-hand threads, the standard thread being American Standard Coarse, Class 2 fit.

Bethlehem also makes an alternate type of rolled-thread rod in sizes up to 1½ in. thread diameter. This rod equals or exceeds the strength of cut-thread rods of equal thread diameter, thus offering the user a saving in cost and weight.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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Other Bethlehem Construction Fastenings

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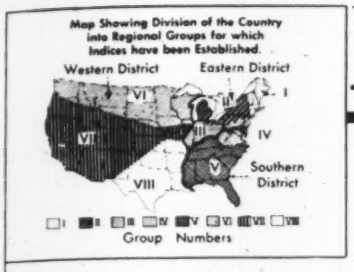
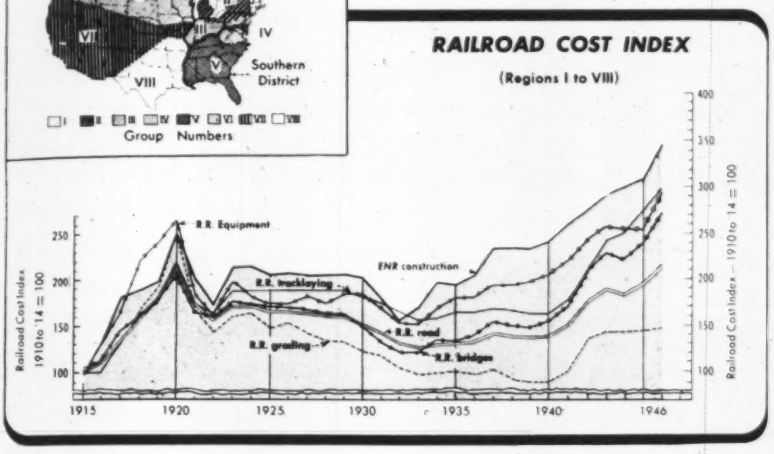
Railroad Construction Cost Indexes





THESE INDEXES by Engineering Section, Bureau of Valuation, Interstate Commerce Commission, include items developed from analysis of major construction contracts over a period of 30 years. Indexes for material accounts are based on studies of carriers' returns to Valuation Order 14, joint studies made with various sub-committees of President's Conference Committee, well-known engineering and trade publications, contracts covering major construction projects over a period of 30 years, and other information furnished by individual carriers.

Railroad Cost Indexes for Regions by Years for "Road" Construction — 1910-14 = 100

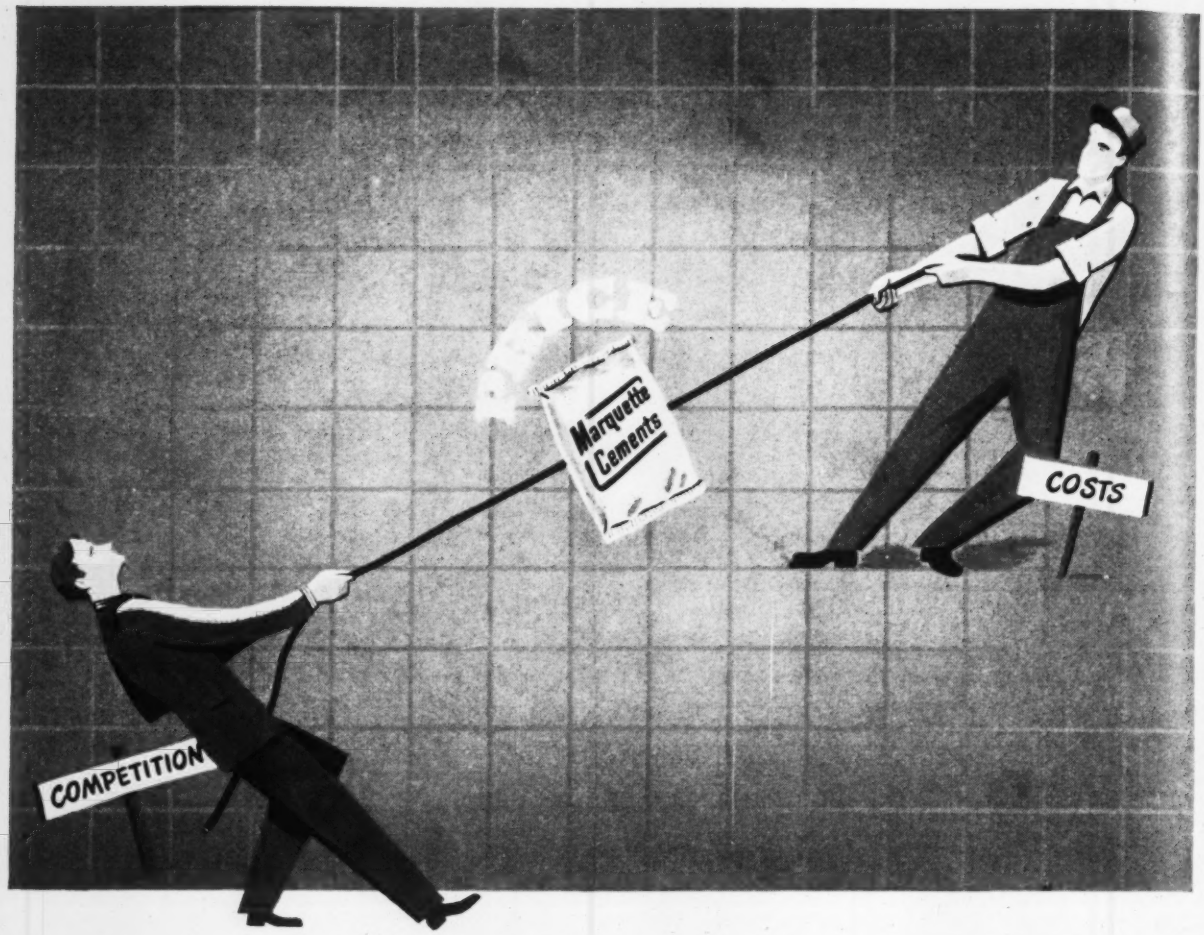
Total of Accounts 1-45, ROAD, Engineering Section, Bureau of Valuation, Interstate Commerce Commission, August 1, 1947

Regions	Per Cent	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
I to VIII	73.09	175	157	171	171	166	166	164	161	160	152	143	131	127	131	131	133	142	138	137	140	151	175	186	187	197	216
I	75.36	178	163	177	178	172	173	171	167	166	158	148	134	131	133	134	136	146	141	140	144	156	180	193	194	206	231
II	68.15	176	160	174	174	168	168	167	165	164	157	145	133	130	134	134	136	146	142	141	145	156	178	189	191	202	223
III	67.99	176	160	173	173	169	168	167	164	163	155	143	132	129	133	133	136	146	142	144	146	157	179	192	194	205	228
IV	70.49	173	152	167	166	164	163	159	155	154	145	133	126	122	125	126	127	137	132	131	135	146	172	184	186	195	212
V	76.66	171	153	168	167	163	164	160	156	156	148	137	129	125	129	128	131	141	137	136	139	149	175	185	186	195	215
VI	77.41	175	155	169	170	163	164	162	158	158	150	138	129	125	128	128	129	139	134	132	135	145	171	182	183	190	207
VII	75.62	177	158	170	170	165	166	163	160	158	151	139	131	128	130	129	131	140	135	133	135	145	162	179	181	188	202
VIII	78.15	173	157	171	171	166	167	164	161	161	154	143	133	130	133	134	135	144	141	140	142	153	175	187	187	198	215

(Indexes represent territorial index factors and are not necessarily applicable for determining unit reproduction costs upon individual roads.)

Railroad Cost Index by Accounts Applicable to Entire U. S., Regions I to VIII, Inclusive

"Road" Construction	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Engineering	175	157	171	171	166	166	164	161	160	152	143	131	127	131	131	133	142	138	137	140	151	175	186	187	197	216
Grading	170	143	160	164	149	153	143	135	133	123	118	106	98	100	101	99	103	93	90	90	99	135	142	143	144	148
Underground Power Tubes																										
Tunnels and Subways	179	165	179	179	179	178	169	155	155	143	130	119	111	122	120	130	139	141	140	149	160	192	223	219	236	260
Bridges, Culverts, etc	165	160	176	173	171	170	168	164	163	150	134	122	122	136	135	141	155	150	149	156	174	210	227	222	240	272
Elevated Structures	150	153	173	171	168	165	163	163	162	154	144	129	122	136	136	137	158	150	149	159	175	209	236	231	249	284
Ties	189	157	177	175	172	173	175	176	175	170	155	144	139	149	147	150	159	154	158	164	181	199	228	234	241	252
Rails	158	144	145	145	144	144	144	144	144	144	144	140	134	123	123	124	143	139	136	138	139	144	144	146	152	165
Other Track Materials	192	161	182	179	177	177	177	177	170	169	165	163	158	150	147	150	169	169	167	167	170	175	173	172	176	190
Ballast	191	176	175	175	174	175	176	176	176	168	159	146	146	141	139	140	143	143	143	143	153	170	175	175	181	194
Track Laying, Surfacing	174	165	188	188	188	188	188	188	188	182	175	164	157	159	165	165	169	167	165	165	178	209	241	252	273	298
Right-of-way Fences	189	177	179	179	176	175	175	175	173	171	164	147	135	140	140	138	143	144	139	139	147	165				
Snow, Sand Fences, Sheds	197	194	212	200	201	201	204	204	204	198	188	125	126	140	140	140	155	155	155	155	164	174	179	179	189	206
Crossings and Signs	171	164	178	175	171	169	166	165	165	161	153	131	127	139	137	139	152	145	142	146	163	198				
Station and Office Bldgs	192	180	194	193	188	184	189	188	187	182	165	141	145	151	151	157	166	166	166	177	188	208	219	227	244	291
Roadway Buildings	192	178	196	196	189	187	192	191	190	186	166	140	145	150	150	150	162	162	162	177	186	206	226	237	258	307
Water Stations	185	178	187	187	186	182	185	186	184	177	161	147	151	155	155	156	166	166	166	172	185	195	208	214	227	249
Fuel Stations	181	166	185	185	182	180	183	183	183	174	159	144	149	154	154	153	159	159	159	163	187	205	216	222	242	270
Shops and Engine Houses	191	180	193	192	188	185	189	188	187	176	161	137	142	147	147	155	165	165	165	176	188	204	216	223	248	294
Grain Elevators	190	184	197	197	193	190	195	193	193	182	165	137	142	147	147	156	164	164	164	166	200	208	213	217	236	281
Storage Warehouses	193	178	198	198	193	189	193	191	191	184	165	137	142	147	147	154	166	166	166	176	195	207	218	226	253	300
Wharves and Docks	167	158	175	175	174	177	178	178	178	172	158	136	141	146	146	149	153	153	153	161	167	212	226	234	255	291
Coal and Ore Wharves	170	159	176	176	174	174	176	176	176	172	157	136	142	147	147	151	153	153	153	160	185	199	211	215	236	278
Gas Producing Plants	194	176	188	189	186	185	188	189	189	178	163	145	148	176	176	178	178	177	179	188	198	200				
Tel. and Tel. Lines	191	162	187	179	163	157	163	165	165	150	138	121	119	124	128	131	135	129	129	134	143	156	165	165	173	192
Signals and Interlockers	163	158	165	164	162	169	158	155	154	147	138	130	130	133	136	138	143	143	143	146	156	165	176	176	176	199
Pwr. Dams, Canal, Pipe Lines																151	149	149	149	150	181	185				
Power Plant Buildings	197	184	196	196	191	186	191	191	189	177	162	138	143	148	148	152	167	167	167	176	194	204	213	219	246	
Power Substation Bldgs	194	180	197	197	192	188	193	191	190	176	161	137	142	147	147	138	164	164	164	175	187	203				
Power Transmission Systems	145	132	142	136	140	141	137	142	150	136	116	98	98	103	105	108	123	110	110	114	119	121				296
Power Distribution Systems	172	163	178	172	175	176	175	178	181	173	148	144	144	148	151	152	1[illegible]	149	149	155	163	165				
Power Line Poles, Fixtures	208	179	209	203	185	183	198	199	209	200	172	147	147	150	153	148	157	152	152	152	173	195				
Underground Conduits	228	214	220	215	220	216	219	219	217	215	175	175	175	180	184	185	185	185	185	185	190	209				
Miscellaneous Structures	192	179	195	195	190	186	191	190	189	182	164	141	146	151	151	154	161	161	161	168	178	183	198	208	229	290
Paving	191	190	191	191	191	190	190	190	190	190	181	156	150	145	145	145	150	150	150	150	171	190				
Roadway Machines	162	149	151	151	151	151	151	149	148	147	144	138	138	147	147	147	161	153	154	158	169	169	187	187	187	222
Roadway Small Tools	181	170	173	185	190	190	191	191	190	160	155	155	150	150	150	160	170	180	180	180	190	200	200	200	200	245
Shop Machinery	198	173	183	185	185	186	187	189	191	176	166	155	155	179	179	179	198	200	202	212	224	224	228	236	236	262
Power Plant Machinery	198	173	183	185	185	186	187	189	191	176	166	155	155	168	166	171	180	177	180	189	194	194	190	190	191	217
Power Substa. Apparatus	198	173	183	185	185	186	187	189	191	176	166	155	155	155	150	145	149	151	150	158	160	160				



WHY CEMENT IS CHEAP

The price of delivered Marquette Cement at any place and time is the result of an economic tug-of-war between two opposite forces: *manufacturing costs* and *competition*.

The price tends to be pulled upward by increases in the costs of labor, materials, equipment and transportation. But the downward pull of competition forces us to keep the price low—or lose our markets.

The only answer is volume production. We must produce and sell Marquette Cement in sufficient quantities to assure a low per-unit manufacturing cost. We must get all the business we can—even in areas where competitors have plants nearer the point of demand and thus enjoy a cost advantage.

That's why Marquette Cement, wherever you buy it, is *cheap*.

Marquette's Fiftieth Anniversary—1898-1948

Marquette Cements

MARQUETTE CEMENT MANUFACTURING COMPANY

CHICAGO · ST. LOUIS · MEMPHIS

PORTLAND • HIGH EARLY STRENGTH • AIR ENTRAINING • MASONRY

Boeckh Index of Construction Costs—U. S. Average, 1926–'29 = 100

Annual Averages By Cities	Residences		Apartments, Hotels, Office Bldgs. Brick and			Commercial & Factory Bldgs.				
	Frame	Brick	Wood	Conc.	Steel	Frame	Steel	Wood	Steel	Conc.
ATLANTA AREA										
1926–29	82.7	87.0	84.2	83.7	87.0	82.9	94.5	84.7	87.5	86.8
1939	82.8	86.0	86.1	95.1	95.0	80.6	96.2	88.6	94.6	97.4
1940	88.1	90.3	90.6	96.8	97.3	86.3	100.1	91.5	97.3	98.4
1942	102.5	102.8	102.8	104.4	105.1	101.1	106.3	101.4	105.1	104.9
1944	124.5	123.2	123.5	117.3	120.0	126.1	117.2	120.7	118.2	117.2
1945	133.9	132.1	132.5	123.3	127.0	135.9	120.7	130.1	123.3	122.8
1946	149.2	148.1	148.2	136.8	139.9	151.7	130.0	146.8	135.1	136.4
1947	184.0	180.4	181.4	158.1	164.6	187.5	150.1	174.9	158.0	157.1
BALTIMORE AREA										
1926–29	107.2	112.0	107.6	100.6	100.7	106.3	95.5	106.8	96.8	101.2
1939	93.5	95.5	95.6	99.3	99.2	94.0	101.7	96.6	101.4	100.2
1940	100.1	101.8	102.0	102.5	103.0	101.0	104.3	102.7	106.1	103.3
1942	115.1	115.0	115.1	113.6	113.9	115.9	112.2	114.4	116.6	114.2
1944	136.3	134.9	135.3	126.7	120.6	139.6	123.4	132.2	129.0	127.5
1945	147.4	145.8	146.0	134.9	137.1	150.9	129.4	141.9	136.4	135.4
1946	163.1	161.7	162.2	149.1	150.8	167.6	138.9	158.8	150.0	148.2
1947	199.5	197.3	196.9	173.9	177.0	204.4	159.7	193.9	175.0	175.6
BIRMINGHAM AREA										
1926–29	91.7	96.7	94.1	95.5	96.8	90.2	97.5	94.6	96.3	96.3
1939	87.8	90.9	91.5	96.1	96.2	84.9	96.9	95.1	95.6	96.3
1940	91.4	94.0	94.5	95.2	96.0	91.4	97.8	97.7	96.7	96.5
1942	108.4	110.8	110.6	110.7	111.0	108.7	107.8	111.3	110.6	112.5
1944	124.6	115.1	125.2	119.7	121.7	125.5	114.6	124.1	119.0	120.9
1945	135.2	135.1	135.7	127.1	121.1	136.2	120.8	133.5	126.2	127.7
1946	149.3	147.4	147.9	137.3	139.4	149.7	128.1	145.4	135.2	137.4
1947	175.3	174.2	174.1	154.9	159.5	182.6	146.1	167.7	153.7	155.7
BOSTON AREA										
1926–29	116.3	120.3	115.4	106.2	107.0	118.8	106.3	112.5	108.7	105.8
1939	106.2	110.4	110.1	116.3	113.7	105.7	114.2	111.5	118.2	118.5
1940	111.7	114.7	114.3	116.8	114.9	112.3	114.6	114.6	119.1	119.2
1942	128.4	129.4	129.0	124.3	123.6	131.5	120.1	123.7	126.3	126.3
1944	145.3	144.2	143.8	136.4	136.4	149.9	132.1	140.1	139.5	139.2
1945	152.5	151.1	150.9	142.1	143.2	157.4	136.7	145.8	144.6	145.0
1946	167.0	166.5	166.0	156.8	156.6	172.1	147.1	161.1	158.5	160.4
1947	203.8	202.5	202.0	182.1	183.8	209.6	166.5	196.4	192.4	185.8
CHICAGO AREA										
1926–29	109.2	114.2	109.8	113.2	109.1	112.9	105.2	105.9	112.0	116.0
1939	110.6	112.5	111.1	123.6	118.7	114.2	117.6	109.3	122.6	127.6
1940	117.3	117.8	116.5	124.9	120.9	121.8	118.5	113.4	124.2	128.4
1942	131.7	130.2	128.9	129.7	127.4	137.7	121.4	122.9	129.2	132.2
1944	146.5	143.6	142.3	139.4	137.4	153.3	130.4	134.8	138.6	142.4
1945	156.6	154.0	152.4	147.8	146.1	163.7	135.7	145.2	146.3	151.3
1946	168.3	166.0	164.2	158.9	156.9	168.1	144.5	157.4	157.0	162.5
1947	201.0	198.3	194.4	180.8	180.1	210.5	163.3	185.0	179.6	184.5
CINCINNATI AREA										
1926–29	100.5	105.0	101.3	101.0	100.2	100.2	99.6	103.1	100.6	101.0
1939	103.3	106.2	105.9	113.9	110.4	103.3	111.7	107.1	113.7	116.5
1940	105.9	108.6	107.8	116.0	112.4	105.9	112.3	108.9	114.5	119.2
1942	117.1	118.4	118.1	120.6	118.8	118.5	115.5	116.9	119.9	122.1
1944	139.1	139.5	139.6	133.0	133.9	141.6	127.2	138.0	134.6	134.7
1945	151.2	152.1	152.1	142.7	142.8	153.1	132.8	151.7	142.9	145.1
1946	165.6	166.8	166.7	154.5	154.7	167.5	140.7	166.4	154.4	156.1
1947	199.8	199.7	199.4	177.5	179.6	203.9	162.5	196.4	179.6	180.1
CLEVELAND AREA										
1926–29	107.2	113.4	108.5	111.3	108.3	109.0	103.0	107.2	110.5	114.8
1939	106.2	109.0	109.5	115.3	112.8	107.5	112.9	109.5	117.7	118.0
1940	107.8	111.1	110.9	116.1	113.5	109.2	112.3	110.5	117.9	119.2
1942	123.2	125.3	124.7	127.6	124.8	128.1	119.9	123.1	128.0	130.8
1944	143.6	143.6	143.0	139.4	138.9	148.5	131.3	138.4	140.6	142.4
1945	154.9	154.7	153.9	148.3	147.3	158.8	136.9	149.6	148.7	151.9
1946	169.2	169.4	168.7	160.2	159.9	174.1	146.4	164.3	161.0	165.9
1947	205.7	203.9	202.7	185.6	185.9	213.4	168.9	198.4	187.3	189.7
DALLAS AREA										
1926–29	103.1	107.3	103.2	98.9	99.1	103.6	100.5	100.9	99.4	99.7
1939	95.1	95.8	96.7	98.8	100.2	94.8	106.6	96.0	101.9	98.9
1940	100.7	100.7	101.8	101.1	103.3	100.9	112.8	100.5	106.5	100.6
1942	117.9	115.9	116.8	110.8	114.5	119.7	118.5	111.3	116.8	109.4
1944	129.2	128.2	128.5	123.6	126.5	131.7	126.8	123.2	126.7	124.4
1945	135.8	134.5	134.9	127.4	131.0	138.2	129.3	130.1	130.8	127.9
1946	150.2	148.8	149.4	139.8	144.4	153.5	140.3	144.6	142.5	141.1
1947	188.2	185.4	183.5	165.8	170.4	194.5	162.8	175.5	167.4	162.6
DENVER AREA										
1926–29	95.0	99.7	95.5	102.4	99.6	95.5	105.5	94.6	101.4	108.0
1939	112.1	112.0	111.2	116.1	114.4	114.3	118.7	109.5	117.0	117.8
1940	110.6	111.8	111.3	117.1	116.1	111.9	119.9	111.4	118.4	119.8
1942	121.8	121.8	120.4	122.5	121.9	124.2	125.1	118.7	124.2	124.9
1944	139.1	137.4	137.3	132.5	134.9	142.5	133.6	133.3	135.4	132.8
1945	147.6	146.7	147.1	141.1	145.2	152.4	145.8	142.2	147.8	144.4
1946	160.1	160.3	159.4	155.3	157.9	164.0	155.6	156.8	160.0	158.3
1947	194.2	194.7	194.9	180.9	184.0	197.9	176.6	192.0	185.6	183.1
DETROIT AREA										
1926–29	103.3	108.4	104.3	102.9	102.4	103.7	103.1	103.5	103.3	104.4
1939	98.8	102.7	102.9	108.6	107.5	98.7	108.8	104.2	111.4	110.1
1940	103.3	106.0	106.3	109.2	108.7	103.6	109.7	106.4	111.6	110.5
1942	119.0	120.6	120.5	121.3	119.9	120.3	116.3	119.4	122.5	123.1
1944	140.0	140.2	140.7	134.5	135.6	143.0	131.0	137.6	138.2	135.7
1945	149.9	149.4	149.7	143.0	144.1	154.3	137.3	145.4	145.8	144.1
1946	165.9	165.9	165.8	157.4	157.9	171.3	147.5	160.9	160.0	159.7
1947	201.2	199.9	199.5	182.3	182.7	208.5	168.3	191.5	186.0	186.1

Annual Averages By Cities	Residences		Apartments, Hotels, Office Bldgs. Brick and			Commercial & Factory Bldgs.				
	Frame	Brick	Wood	Conc.	Steel	Frame	Steel	Wood	Steel	Conc.
KANSAS CITY AREA										
1926–29	100.3	106.5	102.2	105.7	103.3	101.1	105.9	101.9	107.5	108.8
1939	104.4	109.9	109.8	118.3	115.4	103.8	117.2	113.0	120.0	121.6
1940	109.3	114.3	113.5	119.0	117.6	109.1	117.1	115.5	121.0	122.1
1942	123.1	124.7	125.0	124.6	123.6	124.7	121.7	124.8	127.1	126.5
1944	138.4	137.6	137.2	133.3	134.7	142.4	134.2	133.2	136.1	134.3
1945	150.6	148.8	148.7	142.7	144.1	156.5	139.6	143.4	145.4	144.4
1946	166.5	165.6	165.4	158.2	159.5	172.3	151.0	159.8	159.3	160.3
1947	198.6	196.0	195.9	178.4	182.8	205.4	171.1	188.1	182.2	179.6
LOS ANGELES AREA										
1926–29	92.7	97.9	93.5	98.8	96.8	93.5	97.0	91.3	97.5	103.1
1939	93.6	97.2	97.5	103.7	105.0	95.6	109.5	96.8	109.2	104.9
1940	96.3	97.8	98.3	103.2	105.1	96.1	108.9	97.4	109.4	103.5
1942	119.3	115.6	116.1	116.6	119.4	118.3	123.3	112.4	121.3	116.3
1944	132.5	131.2	131.1	129.5	132.4	136.6	135.4	125.1	134.4	131.2
1945	139.8	138.3	139.0	134.9	139.4	144.4	140.9	133.3	140.4	135.0
1946	155.1	156.1	156.2	155.3	156.7	160.1	158.3	150.9	160.0	158.7
1947	192.0	190.8	190.9	180.6	184.1	198.1	176.4	183.4	184.8	182.6
MINNEAPOLIS AREA										
1926–29	92.8	98.2	94.6	95.6	96.1	92.8	100.0	93.9	97.9	98.4
1939	101.9	105.0	104.2	113.5	110.7	102.7	113.4	103.6	114.5	117.2
1940	106.1	108.2	107.5	113.6	111.7	107.8	113.8	105.4	115.3	117.2
1942	121.2	121.4	120.6	120.5	120.9	124.5	118.9	116.8	122.7	124.2
1944	137.7	136.2	135.8	129.8	131.0	142.8	127.5	130.3	132.9	132.5
1945	149.8	150.9	150.8	141.1	141.2	152.2	132.4	149.4	142.6	143.5
1946	163.7	167.6	167.5	156.5	155.7	164.9	142.6	168.2	157.2	159.5
1947	195.5	195.2	194.8	175.2	178.4	199.8	161.9	190.8	178.2	175.5
NEW ORLEANS AREA										
1926–29	93.3	96.3	93.4	86.5	90.6	93.3	93.7	91.5	89.5	86.5
1939	89.0	90.3	91.3	95.4	98.3	88.1	102.8	91.7	98.5	94.9
1940	97.3	97.4	98.1	100.3	102.2	97.3	104.7	97.9	101.6	99.2
1942	110.6	109.9	110.3	110.7	113.0	114.0	118.0	108.9	114.6	111.2
1944	124.6	122.3	122.6	117.7	122.7	128.5	124.6	117.7	122.1	117.1
1945	136.4	134.4	134.5	127.7	131.6	139.1	131.1	130.5	131.6	128.4
1946	148.9	147.4	148.2	138.6	142.8	151.2	138.7	145.4	142.0	138.7
1947	191.9	178.7	179.2	159.2	166.7	186.2	156.4	174.1	162.7	157.4
PHILADELPHIA AREA										
1926–29	100.3	106.3	103.7	105.9	103.1	98.1	101.9	104.2	104.1	107.5
1939	99.2	102.6	102.9	105.7	104.1	98.2	102.0	105.0	105.5	106.7
1940	103.0	105.4	106.0	106.7	106.1	102.1	104.9	107.4	107.9	107.5
1942	121.8	123.5	123.6	123.1	122.0	122.7	116.6	123.0	123.2	125.1
1944	142.8	142.1	142.4	135.6	135.9	145.0	127.6	139.0	135.2	136.5
1945	152.1	151.1	151.9	141.9	143.7	155.3	131.8	147.8	141.3	142.7
1946	165.0	163.9	164.9	153.2	154.6	169.0	141.2	161.1	152.7	154.0
1947	201.9	198.6	198.6	176.7	179.8	206.7	161.2	192.3	175.8	176.9
NEW YORK CITY AREA										
1926–29	133.3	138.4	131.9	122.8	120.4	137.5	113.1	127.4	123.2	125.3
1939	122.1	123.3	122.5	130.6	125.9	125.6	123.7	119.6	130.0	133.3
1940	124.6	125.7	125.1	132.0	127.4	128.0	124.3	122.2	131.2	134.9
1942	140.7	139.1	138.2	137.9	135.6	145.0	128.5	132.6	137.1	139.3
1944	154.3	153.1	152.7	149.6	147.7	159.8	139.8	147.2	149.6	152.6
1945	161.7	160.5	160.1	156.3	155.9	167.2	144.2	155.0	155.4	158.0
1946	182.4	181.8	181.1	177.2	174.6	188.1	158.6	177.4	174.8	179.0
1947	222.0	219.3	218.1	207.6	205.1	229.8	183.0	211.5	203.8	207.5
PITTSBURGH AREA										
1926–29	113.2	118.8	112.8	111.2	107.1	115.4	89.6	112.2	104.6	112.9
1939	113.8	117.0	115.7	117.5	114.2	114.2	109.8	116.5	116.9	119.1
1940	115.0	117.3	116.7	117.7	114.4	115.8	109.5	117.4	116.2	119.8
1942	132.7	131.1	130.6	126.0	124.4	133.9	115.4	128.6	124.8	127.6
1944	149.1	147.3	146.4	138.3	137.0	153.3	125.4	142.6	136.6	139.3
1945	157.6	159.9	155.9	146.1	145.0	161.4	130.3	153.2	143.7	148.0
1946	169.5	169.0	168.0	156.6	155.3	173.5	140.1	166.4	153.2	158.9
1947	204.3	200.6	199.5	180.4	180.8	211.5	160.4	194.0	178.0	181.4
ST. LOUIS AREA										
1926–29	118.6	121.1	115.7	109.9	108.8	121.8	103.3	111.7	107.7	109.3
1939	107.0	110.2	109.9	118.7	116.4	107.6	114.3	110.3	119.2	119.8
1940	109.2	111.9	111.6	119.2	117.0	109.9	113.4	111.6	119.2	120.3
1942	123.3	124.5	124.1	126.9	125.9	126.3	120.9	122.3	126.9	128.6
1944	138.4	138.4	138.3	135.7	136.3	142.1	129.8	136.4	136.6	136.7
1945	152.3	152.8	151.4	146.2	146.4	156.2	135.9	148.1	145.6	148.5
1946	167.4	167.1	166.2	159.1	158.9	171.7	145.3	154.8	158.1	161.1
1947	203.8	202.4	200.8	183.9	185.6	209.6	167.0	194.9	184.0	184.2
SAN FRANCISCO AREA										
1926–29	87.7	93.7	90.4	97.5	96.5	86.1	95.5	95.5	91.8	99.0
1939	99.2	105.7	104.5	117.4	114.4	97.6	114.9	107.4	116.5	121.9
1940	100.7	106.0	106.0	116.4	114.1	99.6	112.2	108.2	115.7	120.4
1942	120.1	123.6	123.4	127.5	127.5	121.1	127.2	123.7	130.8	129.3
1944	137.1	139.4	139.5	139.4	139.7	139.0	137.1	138.4	142.4	142.8
1945	144.3	146.2	146.8	144.5	146.1	147.2	141.9	145.3	147.9	146.8
1946	157.5	159.7	160.0	157.9	159.0	160.5	151.5	158.4	160.0	159.3
1947	191.6	193.1	193.0	183.7	186.1	196.1	174.8	189.3	203.9	208.9
SEATTLE AREA										
1926–29	84.5	92.2	89.2	101.7	95.1	82.4	100.8	92.2	100.5	105.3
1939	96.7	104.4	103.8	119.2	114.9	94.4	115.1	108.3	118.7	125.9
1940	99.0	106.2	105.5	119.1	115.1	97.2	112.8	109.4	117.7	124.9
1942	121.5	122.7	122.3	131.7	128.6	116.5	129.2	124.2	133.4	136.0
1944	135.0	139.3	138.7	144.6	142.3	135.7	140.9	139.0	147.2	149.1
1945	143.7	148.6	148.2	151.7	150.5	143.6	147.0	148.7	154.5	156.8
1946	152.9	158.3	157.9	161.2	159.8	154.3	156.0	158.9	164.2	167.1
1947	188.1	193.1	192.9	188.5	188.8	182.3	177.3	193.1	192.2	193.1
WASHINGTON, D. C.										
1926–29	106.6	107.7	107.9	107.1	105.9	106.0	104.0	108.0	106.4	108.4
1945	153.4	150.3	151.9	144.4	145.9	157.8	135.9	146.5	144.6	143.5
1946	168.5	166.2	167.1	157.1	158.2	173.6	145.2	162.6	157.2	156.6
1947	204.2	200.0	200.0	178.9	182.9	210.3	166.9	193.7	181.0	188.9

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See page 92, Apr. 27, 1939 issue for 1913-1938 data of series for Atlanta, New York, St. Louis and San Francisco.

Current indexes are calculated upon an actual survey at source of local construction cost conditions. Material prices used are those paid by contractors to material dealers. Labor rates are current rates paid by contractors—certain corrections being made in certain areas for labor efficiency and labor shortage. Index includes construction overhead, sales taxes, compensation insurance and social security. The indexes have been primarily engineered to use as local cost conversion factors to construction cost data released by the Boeckh organization. Complete index formula is available in published form in "Boeckh's Index Calculator Tables".

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Public Utility Construction Cost Index

Compiled and published by Whitman, Requardt and Associates, and B. L. Smith & Associates, Baltimore, Md., for the Estate of William W. Handy

Table No. 1 Cost Trends of Building Construction, 1911 to 1914 = 100

(Complete Index reports 13 items entering into Building Construction Costs.) A relates to Reinforced Concrete Bldg.; B relates to Brick Bldg.

	Jan. 1921	Sept 1921	Feb. 1922	Jan. 1923	Jan. 1924	July 1924	Jan. 1925	July 1925	Jan. 1926	July 1926	Jan. 1927	July 1927	Jan. 1928	July 1928	Jan. 1929	July 1929	Jan. 1930	July 1930	Jan. 1931	July 1931	Jan. 1932	July 1932	Jan. 1933	July 1933	Jan. 1934	July 1934	Jan. 1935	July 1935	Jan. 1936	July 1936	Jan. 1937	July 1937	Jan. 1938	July 1938	Jan. 1939	July 1939	Jan. 1940	July 1940	Jan. 1941	July 1941	Jan. 1942	July 1942	Jan. 1943	July 1943	Jan. 1944	July 1944	Jan. 1945	July 1945	Jan. 1946	July 1946	Jan. 1947	July 1947	Jan. 1948
Atlantic Seaboard Division																																																			
A	233	182	165	199	227	224	221	216	213	213	214	203	204	206	209	212	205	194	189	179	171	159	153	165	178	194	191	189	191	192	199	216	214	205	205	207	210	209	220	235	250	253	254	254	256	258	259	260	271	304	336	353	382
B	245	207	188	215	237	232	230	229	228	229	230	223	224	217	219	220	212	207	203	194	189	173	166	175	189	200	195	194	197	197	203	218	217	211	211	214	217	216	224	235	246	250	251	252	254	255	262	265	276	308	329	351	372
North Central Division																																																					
A	228	181	163	193	219	214	212	208	203	201	205	194	195	197	200	203	199	190	185	179	169	154	151	162	175	186	182	182	186	187	196	209	209	200	200	200	202	201	210	225	237	242	243	243	246	248	249	253	256	291	326	339	371
B	238	201	181	206	225	218	216	215	212	211	214	208	209	201	203	205	199	195	192	186	181	164	161	170	183	190	185	184	188	189	197	207	208	203	203	203	205	204	210	220	229	234	235	235	240	241	248	250	259	284	310	324	352
South Central Division																																																					
A	229	181	160	191	213	206	203	196	192	191	194	186	186	188	191	193	187	179	176	159	149	144	140	148	160	173	179	173	175	177	187	200	198	188	188	187	189	190	199	216	232	236	237	235	237	241	242	243	249	279	318	334	364
B	240	224	181	206	221	211	208	205	203	204	205	201	202	195	197	198	190	185	183	168	160	154	151	157	171	179	182	175	178	180	186	198	197	191	191	191	193	194	200	212	223	227	230	229	230	234	235	238	244	272	299	322	341
Plateau Division																																																					
A	221	181	164	192	215	208	208	201	198	197	199	188	189	191	194	196	190	180	177	166	153	149	146	156	168	178	174	172	176	180	188	206	203	194	194	194	197	196	205	218	230	235	235	233	237	237	238	239	248	278	307	327	349
B	232	203	185	207	223	214	214	211	211	210	211	205	205	199	200	201	193	187	184	175	167	163	160	168	182	187	182	181	182	185	191	206	204	199	199	200	201	201	206	214	221	227	229	227	229	230	231	233	257	286	309	331	349
Pacific Division																																																				
A	226	187	165	191	212	205	203	196	191	190	196	185	185	188	191	194	188	178	175	165	157	148	145	153	166	177	174	173	175	178	186	200	199	192	192	192	194	192	201	217	238	241	243	242	243	245	248	248	251	294	328	343	374
B	234	207	185	204	217	206	205	201	198	197	203	197	197	190	192	194	186	180	177	169	164	156	154	156	170	177	172	173	176	179	185	198	197	193	193	193	195	194	199	210	226	231	234	234	236	237	241	242	245	279	303	329	354

Table No. 2 Cost Trends of Gas Plant Construction, 1911 = 100

(Complete Index reports 17 items entering into Gas Plant Construction Costs.) A relates to Total Constr. & Equip.; B relates to Mech. Equip. Exclusive of Gas Holders

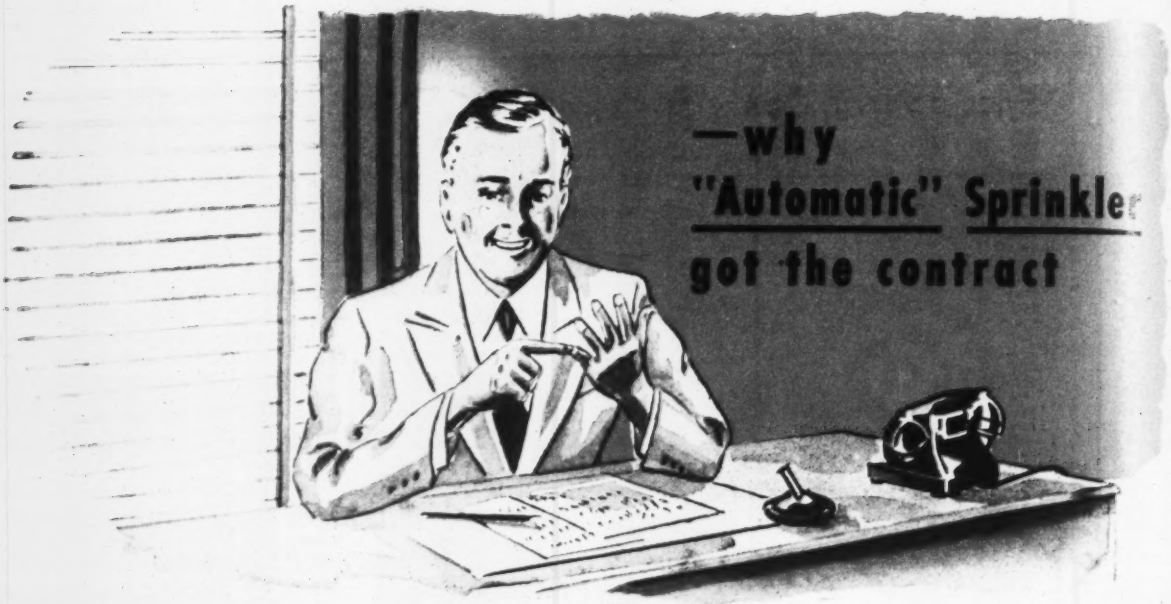
	July 1920	Jan. 1921	Sept 1921	Jan. 1923	Jan. 1924	July 1924	Jan. 1925	July 1925	Jan. 1926	July 1926	Jan. 1927	July 1927	Jan. 1928	July 1928	Jan. 1929	July 1929	Jan. 1930	July 1930	Jan. 1931	July 1931	Jan. 1932	July 1932	Jan. 1933	July 1933	Jan. 1934	July 1934	Jan. 1935	July 1935	Jan. 1936	July 1936	Jan. 1937	July 1937	Jan. 1938	July 1938	Jan. 1939	July 1939	Jan. 1940	July 1940	Jan. 1941	July 1941	Jan. 1942	July 1942	Jan. 1943	July 1943	Jan. 1944	July 1944	Jan. 1945	July 1945	Jan. 1946	July 1946	Jan. 1947	July 1947	Jan. 1948
Atlantic Seaboard Division																																																			
A	279	265	205	224	241	238	234	229	230	230	226	223	215	216	216	219	218	216	214	208	202	188	176	178	189	216	216	217	218	218	225	246	246	244	241	249	253	253	257	264	272	275	276	279	279	279	283	288	302	334	366	398	413
B	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299	298	298	296	296	301	301	369	387	395	403
North Central Division																																																					
A	257	248	201	206	226	224	220	217	217	218	214	211	204	205	204	206	207	208	207	203	198	178	182	185	196	203	202	203	208	208	219	235	237	235	232	232	236	236	238	245	249	254	258	261	262	261	264	269	272	308	335	367	384
B	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299	298	298	296	296	301	301	369	387	395	403
South Central Division																																																					
A	251	246	203	196	214	210	205	199	199	200	198	195	187	187	187	190	188	187	185	177	171	160	158	167	177	184	195	196	202	202	208	223	222	219	216	217	220	220	223	236	244	249	254	255	255	256	258	261	266	298	335	359	379
B	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299	298	298	296	296	301	301	369	387	395	403
Plateau Division																																																					
A	234	231	194	193	210	206	206	201	202	202	198	195	187	189	189	191	189	188	186	181	176	166	170	173	184	191	190	190	195	195	202	221	221	220	216	217	220	220	223	228	232	237	238	238	239	239	240	243	255	290	313	344	359
B	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299	298	298	296	296	301	301	369	387	395	403
Pacific Division																																																				
A	255	248	212	203	219	215	211	206	205	206	206	203	196	197	197	201	200	198	197	191	187	177	180	178	189	196	195	197	198	203	210	228	228	230	227	228	232	231	235	244	253	257	258	261	262	263	264	266	271	315	342	369	387
B	241	248	201	194	220	218	217	213	212	212	216	211	208	209	213	221	224	222	219	217	209	195	192	199	216	230	232	234	240	240	252	277	277	274	274	278	282	282	282	295	297	299	299	298	298	296	296	301	301	369	387	395	403

Table No. 3 Cost Trends of Electric Light and Power Construction, 1911 = 100

(Complete Index reports 50 items entering into Electric Light and Power Construction Costs.) A relates to Total Constr. & Equip.; B to Accessory Electric Equipment† C to Sub-Sta. Equip.

	Jan. 1921	Sept 1921	Jan. 1923	Jan. 1924	July 1924	Jan. 1925	July 1925	Jan. 1926	July 1926	Jan. 1927	July 1927	Jan. 1928	July 1928	Jan. 1929	July 1929	Jan. 1930	July 1930	Jan. 1931	July 1931	Jan. 1932	July 1932	Jan. 1933	July 1933	Jan. 1934	July 1934	Jan. 1935	July 1935	Jan. 1936	July 1936	Jan. 1937	July 1937	Jan. 1938	July 1938	Jan. 1939	July 1939	Jan. 1940	July 1940	Jan. 1941	July 1941	Jan. 1942	July 1942	Jan. 1943	July 1943	Jan. 1944	July 1944	Jan. 1945	July 1945	Jan. 1946	July 1946	Jan. 1947	July 1947	Jan. 1948
Atlantic Seaboard Division																																																			
A	221	183	189	201	196	201	197	197	194	193	187	192	192	195	206	204	188	191	188	182	176	170	177	186	200	200	199	204	205	213	230	226	222	224	225	232	231	233	242	248	248	250	252	251	249	251	259	266	303	327	351	357
B	216	194	186	195	192	199	196	197	196	194	190	193	192	200	208	206	198	198	195	192	186	182	186	200	205	205	204	205	209	210	229	226	223	225	224	235	234	234	236	241	239	242	242	241	226	226	237	248	278	308	323	323
C	201	182	176	187	186	191	190	184	178	176	172	173	173	170	181	179	174	177	175	172	168	165	166	172	184	184	184	185	187	188	204	204	203	203	203	212	212	212	213	217	216	216	216	216	207	207	218	228	252	273	288	288
North Central Division																																																					
A	210	176	179	193	189	194	192	190	187	187	182	186	186	189	199	199	184	188	187	186	174	172	179	187	195	195	194	199	199	209	224	222	216	219	218	222	221	222	232	235	238	238	239	239	237	238	243	245	280	299	324	333
B	197	179	171	185	185	189	189	189	188	188	185	188	187	195	202	203	195	197	199	199	186	186	189	203	204	203	202	204	205	209	227	225	222	224	223	225	224	224	229	229	231	231	231	230	216	216	218	222	249	272	289	292
C	184	167	162	178	179	182	184	178	171	171	168	169	169	167	177	176	172	177	179	181	169	169	171	176	184	184	184	184	184	187	204	203	202	203	202	203	203	203	206	207	209	207	207	207	198	198	200	204	225	240	257	260
South Central Division																																																					
A	216	183	182	193	186	189	186	184	183	182	179	183	186	189	199	197	185	186	183	179	171	169	179	187	195	198	193	199	201	208	224	221	216	218	218	223	224	227	239	245	246	247	247	248	247	248	251	251	288	310	336	344
B	210	188	181	190	186	189	186	187	189	187	186	189	195	202	210	209	205	204	203	200	190	189	198	211	212	212	203	208	212	214	234	232	229	231	230	235	237	240	246	250	248	248	250	235	235	235	235	267	290	311	314
C	195	176	172	182	181	181	181	175	171	170	169	170	176	174	184	182	182	184	183	181	173	173	179	185	192	192	184	188	191	192	211	210	209	210	209	213	216	219	223	226	226	224	224	226	217	217	217	217	243	257	278	281
Plateau Division																																																				
A	209	178	179	192	186	191	191	190	188	186	181	185	185	188	198	197	181	183	181	177	171	169	179	188	196	196	195	198	198	206	225	221	216	218	219	223	222	223	232	234	236	236	236	235	233	238	241	244	282	300	329	334
B	202	186	178	191	189	191	194	197	196	194	190	193	193	200	208	207	199	198	197	194	188	188	197	211	212	211	210	210	210	212	234	232	229	231	232	235	234	234	236	237	236	235	235	234	219	225	225	225	259	279	302	303
C	187	173	168	184	183	184	188	185	177	176	172	173	173	171	182	179	175	177	177	175	171	171	177	183	191	191	191	189	189	189	210	209	208	209	211	212	212	212	212	213	212	210	210	210	201	207	207	207	234	246	269	269
Pacific Division																																																				
A	214	185	178	187	182	185	182	180	178	181	175	180	179	182	192	191	176	178	175	172	163	161	167	178	189	189	192	196	197	204	221	218	214	216	215	219	218	219	231	235	242	242	243	245	241	242	244	244	283	300	332	339
B	206	191	172	180	178	180	178	178	177	182	178	181	180	187	195	193	186	186	185	182	170	170	178	191	198	197	203	204	204	206	226	223	221	222	222	223	223	223	231	231	240	240	240	239	225	225	225	225	256	275	303	303
C	193	180	163	174	173	174	173	167	161	165	162	163	163	161	171	168	165	167	166	164	155	155	161	166	179	179	184	185	185	186	204	203	202	203	202	203	203	203	209	210	219	217	217	216	208	208	208	208	234	244	272	273

†Formerly called "Electric Plant-Steam."



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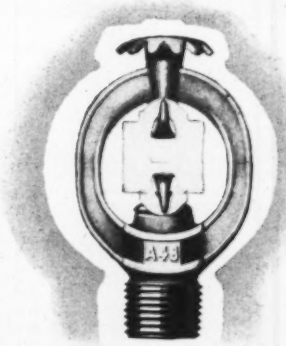

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Compiled and published by MARSHALL AND STEVENS, Chicago, Illinois

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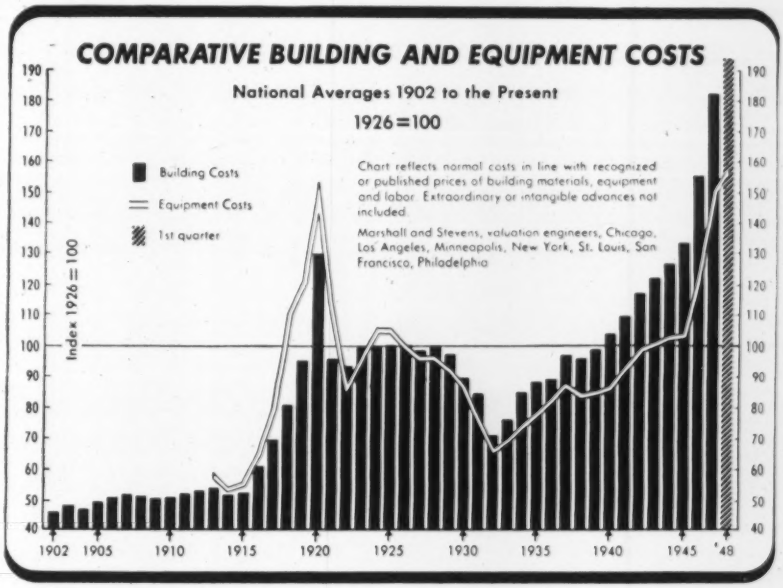
Comparative equipment costs, developed to cover the composite of the entire plant, machinery of various kinds, mechanical installation, furniture and fixtures, hand tools and other and combined in proper proportion to their average occurrence in each plant are computed for 47 industries. (Eleven series are reproduced here, five of which are averages of 3 or more M&S related series). These are M&S estimates of actual costs paid for installed plant equipment, as a whole, over the various years.



Equipment Costs Index, By Type of Industry—1926 = 100

Industry	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926
Average of All	**57.9**	**54.1**	**55.9**	**62.8**	**81.5**	**109.7**	**122.0**	**153.3**	**115.5**	**85.5**	**97.8**	**105.3**	**105.3**	**100.0**
Commercial (Aver. of 12*)	58.8	55.5	57.5	66.8	81.2	98.5	117.6	150.7	116.4	95.7	104.5	105.7	106.3	100.0
Transportation—Garage	69.0	69.0	67.1	74.8	85.0	116.0	124.7	154.6	118.9	84.8	98.2	106.7	105.8	100.0
Public Utility (Aver. of 2*)	59.1	55.7	56.7	64.3	83.1	114.2	128.1	152.2	115.8	83.2	96.3	106.1	105.0	100.0
Process (Aver. of 9*)	59.1	55.1	56.5	63.4	81.7	112.2	121.1	154.5	114.7	83.3	96.5	105.4	106.3	100.0
Food (Aver. of 10*)	57.8	54.2	55.4	62.8	79.4	109.8	121.2	150.3	114.6	85.2	97.6	105.0	104.7	100.0
Metal Working	57.1	54.0	56.5	62.8	82.4	110.4	120.8	151.4	116.4	85.3	98.5	105.7	105.6	100.0
Aircraft	....	....	....	....	....	100.2	114.5	150.1	111.4	85.5	97.9	103.8	104.9	100.0
Mach. and Parts—Elec. Equip.	59.2	54.2	56.4	63.7	83.3	111.7	122.5	155.1	116.4	85.0	97.7	105.4	105.8	100.0
Textile	61.1	58.1	58.8	66.5	84.3	112.3	125.5	162.2	121.5	88.5	100.7	103.0	106.2	100.0
Woodworking	56.6	53.6	54.5	61.8	78.0	106.4	116.3	144.7	116.3	84.5	95.1	103.9	103.3	100.0
General (Aver. of 7*)	59.2	56.3	58.1	65.6	83.0	109.9	121.9	154.7	117.3	87.2	99.4	106.0	106.3	100.0
Cold Storage-Refrigerating	59.3	56.3	57.1	63.2	83.2	113.5	122.9	153.5	116.7	83.9	96.5	96.1	109.9	100.0
Contractors' Equipment	63.0	59.2	61.2	67.5	88.2	122.6	129.0	154.4	119.7	83.5	97.3	107.2	105.4	100.0

Industry	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Average of All	**96.0**	**96.5**	**91.9**	**87.0**	**76.9**	**66.1**	**69.4**	**74.6**	**78.0**	**81.6**	**88.3**	**84.4**	**84.8**	**86.6**
Commercial (Aver. of 12*)	95.9	96.5	91.8	86.3	74.4	67.6	69.4	73.9	75.1	79.7	86.4	84.3	86.8	89.8
Transportation—Garage	96.1	96.8	91.5	85.2	76.9	69.2	70.7	75.1	77.5	81.6	86.8	83.4	83.6	84.9
Public Utility (Aver. of 2*)	96.3	96.9	91.8	86.1	83.1	70.1	70.7	75.5	78.7	82.7	87.4	83.3	82.9	84.2
Process (Aver. of 9*)	97.9	96.5	90.5	85.1	77.7	73.2	71.3	75.5	79.0	82.4	88.2	84.3	83.6	84.4
Food (Aver. of 10*)	96.0	96.5	92.6	86.0	76.4	68.5	72.1	77.2	79.3	83.1	88.6	85.1	84.9	86.3
Metal Working	96.4	97.1	92.3	86.0	75.1	67.9	69.3	75.3	76.8	80.0	87.3	84.1	83.6	88.6
Aircraft	96.3	96.9	93.0	86.5	75.3	66.7	68.7	73.4	76.8	80.3	87.8	84.9	85.0	88.1
Mach. and Parts—Elec. Equip.	96.4	97.1	92.0	86.1	76.8	68.0	70.1	74.8	77.9	81.0	86.8	83.6	83.4	85.4
Textile	95.7	96.6	91.1	86.0	77.4	67.8	69.5	73.5	76.1	80.7	86.9	83.9	83.7	84.7
Woodworking	94.2	95.0	92.0	86.4	76.8	67.2	69.4	74.4	76.6	81.1	87.1	84.1	83.6	84.6
General (Aver. of 7*)	96.2	98.9	95.5	87.8	76.6	68.8	72.4	76.6	78.1	81.5	88.0	84.6	84.6	86.1
Cold Storage Refrigerating	96.3	97.0	92.0	86.4	75.0	70.0	71.3	75.4	78.9	83.0	87.5	83.0	82.1	83.1
Contractors' Equipment	95.9	96.8	91.0	86.1	77.6	71.9	71.8	76.0	79.7	83.0	87.2	82.9	82.4	83.4

Industry	1941	1942	1943	1944	1945	1946	1947	3/'48
Average of All	**92.6**	**99.6**	**100.5**	**102.4**	**103.4**	**123.2**	**150.6**	**158.4**
Commercial (Aver. of 12*)	95.6	101.9	102.3	104.1	105.2	120.9	146.9	155.6
Transportation—Garage	90.1	96.9	97.7	99.3	100.9	123.9	157.0	165.1
Public Utility (Aver. of 2*)	88.6	94.3	95.1	96.6	97.5	119.5	145.8	154.7
Process (Aver. of 9*)	91.5	99.2	100.6	102.9	103.8	123.0	149.1	157.4
Food (Aver. of 10*)	91.7	98.5	99.8	102.8	104.1	126.1	156.8	164.5
Metal Working	100.2	109.5	110.0	110.3	110.7	131.2	151.3	157.3
Aircraft	97.1	106.4	107.2	108.8	109.8	127.9	162.9	172.3
Mach. and Parts—Elec. Equip.	94.3	103.1	104.1	105.9	106.8	130.3	156.6	162.9
Textile	91.1	99.1	100.1	100.9	101.8	122.1	146.6	152.9
Woodworking	90.1	97.0	98.2	100.1	100.9	123.0	149.6	155.9
General (Aver. of 7*)	92.1	99.5	100.3	101.8	103.2	122.0	149.7	157.1
Cold Storage-Refrigerating	89.0	95.8	97.0	100.1	101.7	125.7	163.2	170.6
Contractors' Equipment	92.0	100.8	101.3	101.6	102.5	124.2	150.3	156.6

* In each of these categories, MARSHALL AND STEVENS report separate comparative equipment cost trends for:

Commercial: Apartment, Bank, Church, Hotel, Library, Restaurant, School, Store, Theatre, Hospital, Dwelling, Office

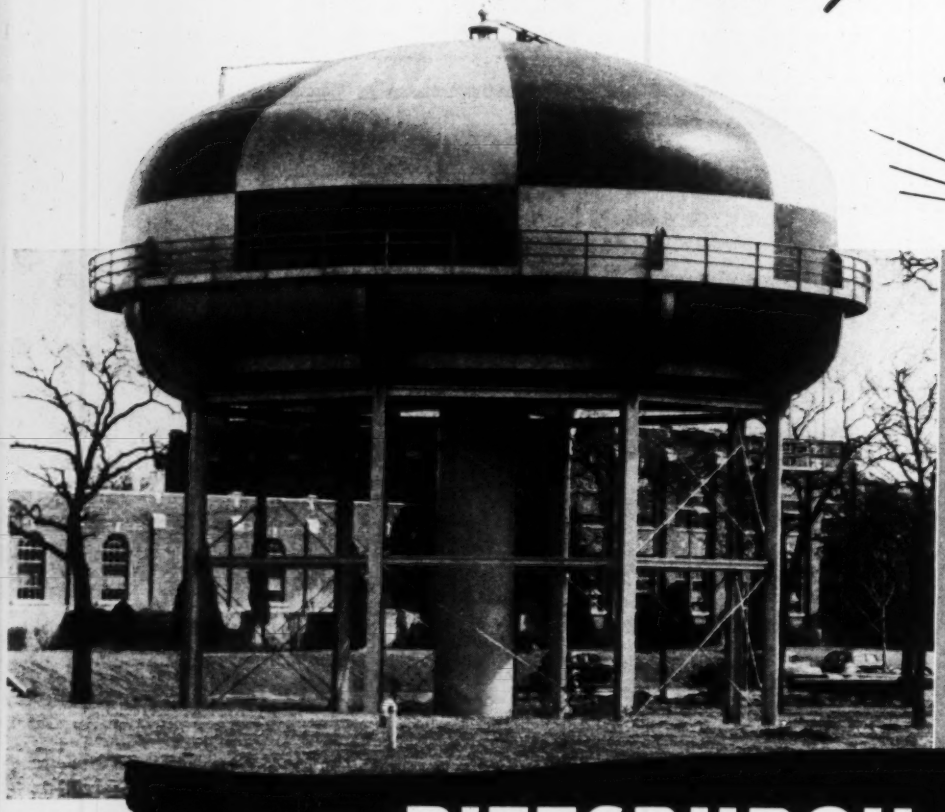
Public Utility: Steam Power, Electric Power

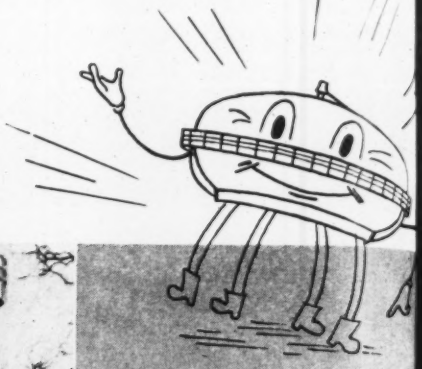
Process: Distillery, Cement, Chemical, Glass, Petroleum Industry, Paint, Paper, Rubber, Clay Products

Food: Bakery, Bottling, Brewery, Candy, Cannery-fish, Cannery-fruit, Creamery, Dairy, (Flour, cereal feed), Packing-fruit, Packing-meat

General: Laundry, Mining and Milling, Motion Picture, Printing, Shipbuilding, Warehouses, Logging Equipment

MEET "*Mr. Five-by-Five!*"





the largest wash-water tank in the country... at *Dallas, Tex.*

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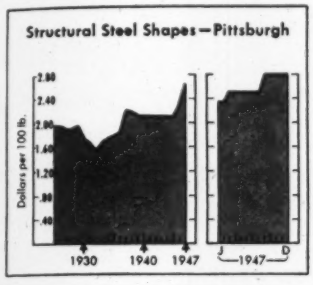
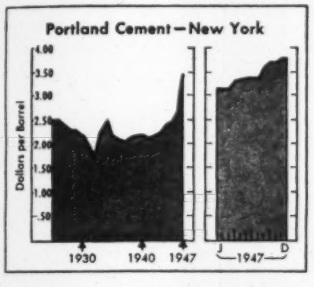
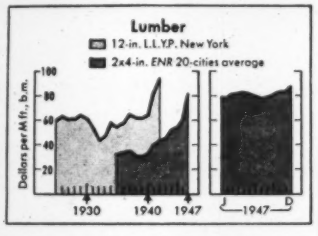
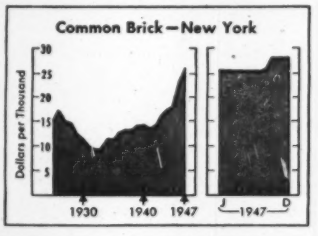
Prices of Construction Materials

MATERIAL PRICE TRENDS









CONSTRUCTION MATERIAL PRICES rose 36 percent in 1947 according to the Bureau of Labor Statistics combined index of building materials. The 1947 index averaged 179.7 compared with the 1946 index of 132.2. Lumber prices showed the greatest gain, rising 55 percent over 1946. Other building material prices registered gains in the following order; paint and paint materials, 40 percent; plumbing and heating, 21 percent; brick and tile and structural steel, 13 percent; and cement, 11 percent.

Basic Building Materials Prices—New York City

Average yearly prices at New York, except in the case of steel, which is f. o. b. Pittsburgh mill; wrought iron I beams for years 1879, 1885 and 1886. Brick, wholesale, f. o. b. Lime, common lump, wholesale, f. o. b., 180 lb., net, 1910–15, incl.; afterward, 280 lb. Cement, net, delivered; *Rosendale, 1874 to 1878, incl.*; afterward, Portland. Lumber, No. 1 com., rough, wholesale, at dock, for 1 in., yel. pine, 1874 to 1909, incl.; afterward, 3 in., long-leaf to 1913, incl. *LLYP–3 x 12 — from Lumber Trade Journal. †LLYP–12 x 12 as reported to Engineering News-Record. Cast iron pipe price per ton f. o. b. Delaware River foundries; *prices prior to 1901 are for all classes of bell and spigot;* prices subsequent to 1901 are for 6 in. and larger Cl. B or heavier bell and spigot; early prices from "Price History of Cast Iron Pipe" by United States Cast Iron Pipe and Foundry Co.; prices 1850, $35.72; 1855, $40.18; 1860, $32.15; 1865, $58.05; 1870, $50.

	Brick Common per M	Cement Per Bbl.	Lime Per Bbl.	Pine per M. Ft. b.m.		Steel Shapes, Per 100 Lb.	Cast Iron Pipe, Per Ton
1874	$7.41	*$1.48*	$1.50	$26.00		....	*$45.76*
1875	7.12	*1.25*	1.40	21.00		....	*37.51*
1876	5.87	*1.20*	1.00	21.00		....	*31.26*
1877	4.93	*1.10*	.80	20.00		....	*25.00*
1878	4.71	*.95*	.70	20.00		....	*23.22*
1879	4.08	2.70	.80	20.96		$2.78	*29.47*
1880	7.00	2.88	.87	19.00		....	*29.47*
1881	7.50	2.72	.95	19.00		....	*33.04*
1882	7.12	2.82	1.01	19.00		....	*35.68*
1883	8.28	2.75	1.05	19.00		....	*32.15*
1884	6.65	2.60	.95	19.00		....	*26.79*
1885	6.10	2.28	1.00	18.66		3.12	*25.00*
1886	7.51	2.28	1.00	19.00		3.00	*26.79*
1887	7.43	2.07	.82	19.00		....	*28.58*
1888	6.50	2.16	.83	16.75		....	*25.00*
1889	7.06	2.23	.92	20.31		....	*28.04*
1890	6.65	2.25	.95	21.75		....	*24.65*
1891	5.53	2.38	.87	18.00		....	*23.04*
1892	5.77	2.27	.93	18.50		....	*21.43*
1893	5.83	2.15	.93	18.50		....	*21.30*
1894	5.00	2.03	.85	18.50		1.20	*18.47*
1895	5.31	1.97	.78	16.92		1.35	*17.96*
1896	5.06	2.00	.69	16.42		1.60	*17.64*
1897	4.94	1.97	.72	16.44		1.24	*15.48*
1898	5.75	2.00	.70	15.75		1.27½	*15.48*
1899	5.69	2.05	.75	16.25		1.45	*21.17*
1900	5.25	2.16	.68	24.50		1.95	*22.33*
1901	5.77	1.89	.77	17.50		1.60	*21.63*
1902	5.39	1.95	.81	21.00		1.60	26.62
1903	5.91	2.03	.97	23.50		1.70	27.56
1904	7.50	1.67½	.80	21.50		1.60	22.92
1905	8.10	1.43	.89	24.92		1.62	26.54
1906	8.55	1.55	.95	29.33		1.60	30.12
1907	6.16	1.55	.95	30.50		1.75	31.52
1908	5.10	1.46	1.05	30.50		1.76	24.69
1909	6.39	1.41	1.05	33.04		1.50	24.19
1910	5.70	1.07	.75	24.00		1.46	22.99
1911	5.31	1.04	.75	24.63		1.36	19.99
1912	6.75	.97	.75	24.92		1.33	21.22
1913	6.75	1.18	.91½	* 25.04	†	1.50	21.96
1914	5.50	1.17½	.97	21.79	29.25	1.16	20.37
1915	5.50	1.00	.97	21.68	27.91	1.28	22.52
1916	8.00	1.32	1.50	27.60	31.58	2.45	30.25
1917	9.10	1.76	2.02	38.00	37.81	3.62	52.33
1918	10.98	2.48	2.16	46.68	43.33	3.00	58.68
1919	15.79	2.63	2.65	57.04	49.60	2.52	53.87
1920	18.00	3.52	3.15	71.17	66.50	2.45	71.77
1921	17.40	2.82	3.47	50.67	51.54	2.00	50.58
1922	16.91	2.43	2.79	49.41	51.83	1.70	46.42
1923	20.00	2.66	2.98	61.77	62.25	2.39	57.75
1924	18.00	2.50	2.88	55.17	59.00	2.19	54.33
1925	15.00	2.50	2.38	57.00	59.67	1.95	49.16
1926	17.00	2.50	2.18	60.33	62.17	1.93	48.50
1927	15.00	2.40	2.49	62.57	61.46	1.86	41.42
1928	14.00	2.30	2.30	63.33	61.34	1.87	35.92
1929	11.71	2.23	2.25	64.50	63.00	1.92	36.66
1930	10.88	2.19	2.25	64.33	60.64	1.71	37.00
1931	10.29	1.89	2.25	58.17	53.02	1.63	34.71
1932	9.75	1.62	2.25	39.91	41.33	1.56	30.58
1933	9.50	2.26	2.50	46.25	46.79	1.64	34.58
1934	10.87	2.48	2.50	57.17	58.92	1.78	41.00
1935	11.00	2.15	2.35	51.67	53.75	1.80	42.58
1936	12.00	2.26	2.80	56.75	57.75	1.84	43.00
1937	12.50	2.07	2.80	61.50	66.46	2.21	48.75
1938	13.10	2.12	2.80	59.33	62.75	2.18	48.33
1939	13.46	2.20	2.80	64.35	62.50	2.10	46.75
1940	13.50	2.20	2.68	67.39	65.46	2.10	49.00
1941	13.13	2.15	2.66	75.50	83.33	2.10	49.00
1942	14.17	2.20	2.80	85.61	98.33	2.10	49.00
1943	15.88	2.27	2.80	88.81	.....	2.10	49.00
1944	17.46	2.42	2.80	89.92	.....	2.10	49.00
1945	18.33	2.45	2.80	89.92	.....	2.10	50.00
1946	23.04	2.71	15-40a	93.58c	.....	2.29	60.08
1947	26.38	3.46	24.34a	115.83c	.....	2.61	75.46

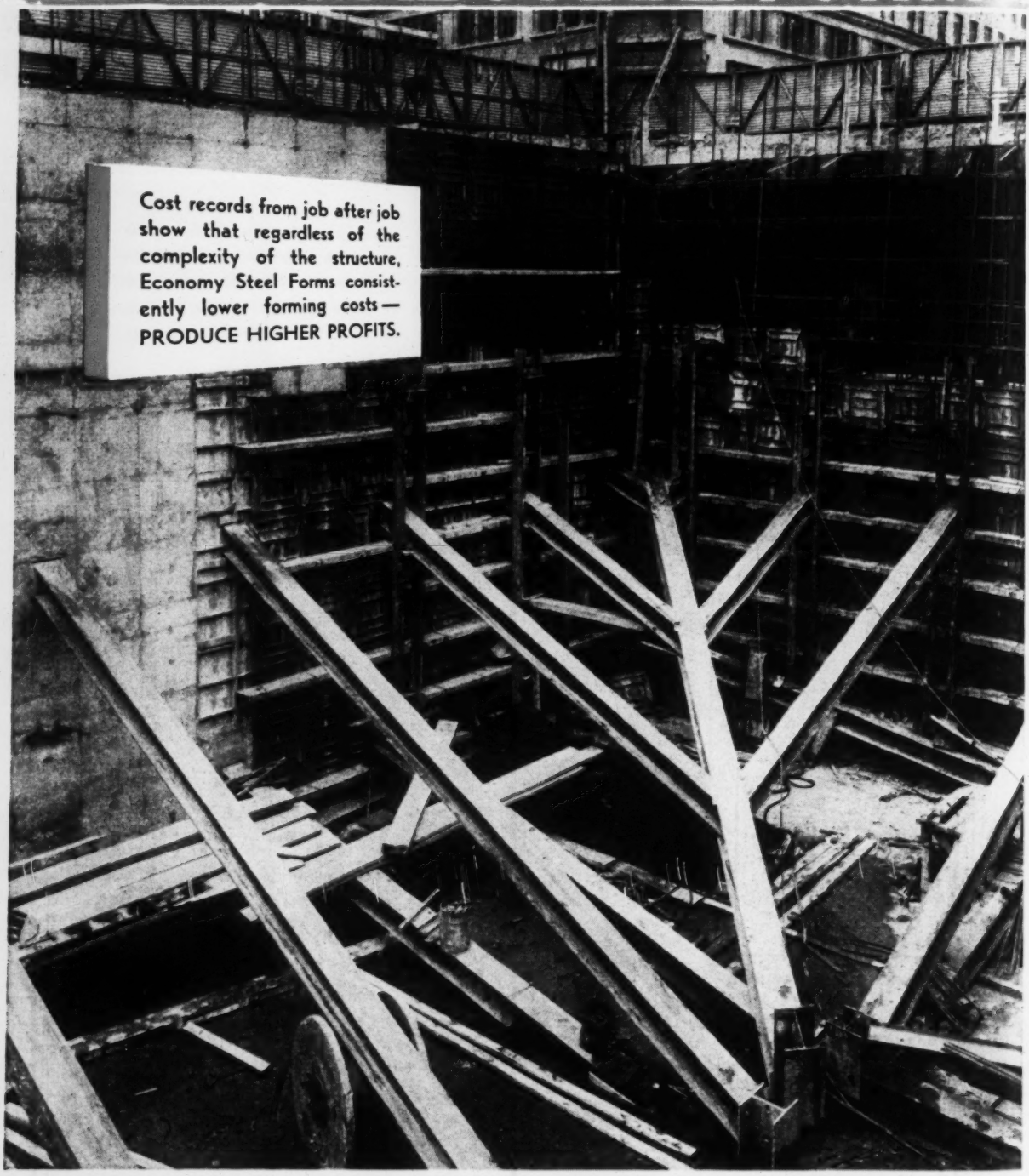
Common lump wholesale, f.o.b., 180-lb. net — 280 lb.

aCommon hydrated, del., per ton; 40 bags (50 lb./bag) to a ton. Price not quoted per bbl. c 3 x 12 Rgh. SLYP. LLYP not available.

Index Numbers of Wholesale Prices—Bureau of Labor Statistics

(1926 = 100)	1947	1946	1945	1944	1943	1942	1941	1940	1939	1938	1937	1936
ALL BUILDING MATERIALS	179.7	132.2	117.7	115.5	111.4	110.2	103.2	94.8	90.5	90.3	95.2	86.7
Brick and tile	139.6	123.0	112.3	161.7	99.1	98.0	93.7	90.5	91.4	91.0	93.5	88.7
Cement	115.5	104.1	99.4	95.8	93.8	94.0	92.0	90.8	91.3	90.3	89.0	92.2
Lumber	276.0	177.5	154.9	152.7	141.3	133.0	122.5	102.9	93.2	87.4	99.7	87.0
Paint and paint mat.	165.5	118.3	106.8	105.2	102.3	100.3	91.4	85.7	82.8	81.3	83.4	80.1
Plumbing and heating	125.4	103.5	93.4	92.2	90.7	95.4	84.8	80.4	79.2	78.5	78.8	75.0
Structural steel	134.3	118.5	107.3	107.3	107.3	107.3	107.3	107.3	107.3	111.0	113.2	95.0
Other building mat.	147.1	117.9	104.3	103.1	102.0	103.5	98.3	93.3	90.3	92.7	91.1	90.2

Synonym for ADAPTABLE:
ECONOMY STEEL FORMS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MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents Mexico City, Mexico prices are published in this section of Engineering News-Record each month.

CEMENT, AGGREGATE, READY-MIXED CONCRETE — F. O. B. CITY

	PORTLAND CEMENT* Per bbl. C/L lots incl. $1.00 per bbl. for bags, cash. dis. not deducted			SAND AND GRAVEL Per ton, carload lots Gravel.	Gravel.		CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.; truckload del.; per block	CONCRETE Ready Mixed 1:2:4, over
	Cloth	Paper	Bulk	1½ in.	¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand grav.	Lt.wgt. Agg.	50 c.y., del.
Atlanta	$3.87	$3.07	$2.82	....	....	$1.75	$2.10	$2.10	$1.65	$1.85	$0.1725	....	$10.05
Baltimore	3.71	2.91	2.66	$2.10*ff*	$2.10*ff*	1.60*ff*	2.25*ff*	2.35*ff*	2.20*ff*	2.20*ff*	.145	$0.145*w*	8.55
Birmingham	3.55	2.75	2.45	2.06	2.06	1.63	2.50	2.50	1.00	1.20	.15	.15	6.95
Boston	4.13	3.33	3.08	1.50‡*t*	1.50‡*t*	1.40‡*t*	1.25‡*t*	1.35‡*t*	....	....	.186	.195*w*	9.40*m*
Chicago	3.65	2.85	2.60	2.60‡*d*	2.60‡*l*	2.85‡*l*	2.60‡*l*	2.60‡*l*	2.00‡	2.00‡	.20	.20*x*	....
Cincinnati	3.69	2.89	2.64	1.70‡*bb*	1.70‡*bb*	1.60‡*bb*	2.75‡*bb*	2.75‡*bb*	....	....	.17	.195	9.00*kk*
Cleveland	3.64	2.84	2.54	1.90*lli*	1.65*lli*	1.25*ll*	3.20‡*h*	3.20‡*h*	2.45	2.45	....	.20	10.40*nn*
Dallas	3.57	2.72	2.47	1.80	1.80	1.60	1.89	1.99	....	....	.0775*p*	....	8.68
Denver	4.03	3.23	2.98	1.85	2.00	1.15	....	....	....	....	.2245	.2245*w*	9.25
Detroit	3.54	2.74	2.49	3.00‡	3.00‡	2.75‡	2.75‡	2.75‡	2.75‡	2.75‡	.17*w*	.18*w*	8.30*kk*
Kansas City	3.68	2.88	2.63	1.85	1.85	1.40*t*	1.45*q*	1.45*q*	....	....	.16*wf*	.175*xy*	9.50*n*
Los Angeles	3.90*eeb*	3.40*b*	2.05*b*	1.87*t*	1.87*t*	1.67*tnn*	1.87*t*	1.95*t*	....	....	.08*no*	....	9.39*m*
Minneapolis	3.85*dd*	3.05*dd*	2.80*dd*	2.00*h*‡*j*	2.00*h*‡*j*	1.10*h*‡*j*	2.10*h*‡*j*	2.10*h*‡*j*	....	....	.19*cco*	....	10.05*jkk*
Montreal	....	2.17*r*	2.02*r*	1.78*bbs*	1.78*bbs*	1.10*s*	.95*cs*	1.05*cs*	....	....	.1391	.1515*w*	7.75*ls*
New Orleans	3.43	2.58	2.33	1.82	1.82	1.62	....	....	.90	1.15	...	....	9.92
New York	4.75‡	3.75‡	....	1.85*de*	1.85*de*	1.30*de*	2.00*de*	2.00*de*	....	....	.16/.18*ii*	.16/.18*wccii*	9.90*k*
Philadelphia	3.52‡	2.72‡	2.47‡	2.20‡	2.30‡	2.05‡	1.90‡	1.95‡	1.50	1.50	.20/.22	.20/.22*w*	9.25
Pittsburgh	3.51	2.66	2.41	1.90‡	1.90‡	2.20‡	2.35‡	2.35‡	1.90	1.90	.22*z*	.22*z*	10.85
St. Louis	3.66*o*	2.86*o*	2.61*o*	2.25‡*oh*	2.25‡*oh*	2.00/2.25‡*oh*	1.35*c*	1.35*c*	....	....	.195	.22*yo*	10.15
San Francisco	....	3.04	2.64	1.71	1.71	1.81	1.81	....	....	....	....	.25*y*	9.80*u*
Seattle	....	3.20*mm*	2.80*mm*	2.50‡*od*	2.50‡*od*	2.50‡*od*	3.00‡*od*	3.00‡*od*	....	....	.18*o*	....	9.00*o*

‡ Delivered. *a* F.o.b. truck at plant. *b* 20c. per bbl. off for payment by 10th of following month. *c* F.o.b. quarry. *d* Per cu. yd. *e* Barge lots alongside docks. F.o.b. truck on job. *g* Pea gravel. *h* Truck Lots. *i* ½ in. *j* 5% discount for cash. *k* Discount of 2 percent for cash in 10 days. *l* 2000 lb. concrete. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 5½ x 8 x 12 in. *q* F.o.b. car or truck at plant. *r* 10¢ per bbl. off cash 20 days. *s* 8% sales tax included. *t* Truck delivery. *u* 10 to 100 c.y. brackets. *w* Cinder. *x* Waylite. *y* Haydite. *z* Celocrete. *aa* Aver. haul, 7-9 mi. zone. *bb* 5 tons or more. *cc* Also 8 x 8 x 18 in. *dd* Dealers sell only in LCL. This is price for CL and does not include dealer's commission. *ee* 20c refund for each returnable bag. *ff* LCL. *gg* 10c. refund for each returnable bag. *hh* Truck loads up to 500 c.y. Over 500 c.y lots, 50¢ less per yd. *ii* Yard price. *kk* 2500 lb. compression strength. *jj* 30¢ refund for each returnable bag. *ll* Price at plant, called for. *mm* 10¢ per bbl. off cash 10 days. *nn* Concrete Sand .00 4x8x12 std. wgt. * Prices include dealer's commission except where indicated to the contrary.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICE BASES AT CEMENT MILL

Charge for bags not included. For cloth bags, add $1.05 per bbl.; 25c. refund allowed for each returnable bag; for paper bags add 25c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind.	$2.10	$2.10	Ironton, Ohio	$2.05*	$2.05*	Universal, Pa.	$2.10	$2.10
Hannibal, Mo.	2.10	2.10	Northampton, Pa.	2.00	2.00	Waco, Tex. (Plus 9c. tax in Tex.)	1.95	1.95
Independence, Kans.	2.10	2.10	Richard City, Tenn.	2.10	2.10	Montreal City (Discount 10c. per bbl. 20 days)	1.88	1.88
* Destination price base effective Aug. 14, 1947			Steelton, Minn.	2.20	2.20			

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS — F. O. B. CITY

	PAVING BRICK AND BLOCK Granite per M lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	PAVING ASPHALT Per ton, less than 80 penetration Tank car	Drums	ASPHALT BINDERS—FLUXES Per gal., 80-300 penetration Tank car	Drums	CUTBACK ASPHALT Per ton Tank car	Drums	ROAD OIL Per gal. Tank car	ASPHALT EMULSION (Quick-breaking) Per gal. Tank car	Drums
Atlanta	$73.00	$35.00	$2.25	$14.00	....	$0.074	....	$0.0806*h*	....	$0.0781	$0.0806	....
Baltimore	150.00‡	52.70‡	.....	15.00	$21.00	.0775	$0.1075	13.00	$23.00	.10	.075†	$0.11
Birmingham	.....	32.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston	85.00	59.00	3.75	17.00*o*	29.50*o*	.0723*o*	.1447*o*	.075*ho*	.15*ho*	.07*o*	.0907*o*	.18*o*
Chicago	150.00‡*y*	75.00/80.00*e*‡	2.97/4.10*d*‡	19.00/20.00*b*	29.00/29.50*b*	17.50*bg**	26.50/27.00*bg*	.085/.0875*bh*	.17/.1725*bh*	.0725/.075*b*	0925/.1025*b*	.14/.165*b*
Cincinnati	.....	.....	.....	19.40*z*	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	186.52	47.00*t*	3.77	24.50	36.00	24.50*g*	36.00*g*	.105*h*	.24*h*	.11	.135	.24
Dallas	*l*	40.00	*l*	16.95	29.15	.0686	.1225	20.00	37.60	.05	.0675	....
Denver	.....	38.00	.....	.....	.....	.....	.....	23.50	.....	20.00*g*	.....	.....
Detroit	.....	63.00*x*	.....	20.00	26.00	18.40*g*	24.40*g*	.0811*h*	.128*h*	.075	.1085	.1522
Kansas City	.....	40.00	.....	17.60	.....	16.00*g*	.....	.075*h*	.....	.0675	.09	.....
Los Angeles	*l*	.....	*l*	12.50*bf*	.....	.....	.....	13.00*b*	.....	.04*b*	.10*b*	.20*b*
Minneapolis	.....	.....	2.39*d*	23.00	32.00	17.00*g*	28.00*g*	23.00	33.00	.08	.09	.15
Montreal	100.00	.....	.....	16.60*k*	24.25*k*	11.60*kp*	14.85*kp*	11.50*kp*	13.50*kp*	.08*kj*	.135*k*	.188*k*
New Orleans	.....	.....	.....	15.50*a*	.....*s*	13.50*ga*	.....*s*	6.75*a*	.....*s*	.055	.08	.13*n*
New York	.....	.....	2.25*d*	20.95	31.35	19.95*g*	37.79*g*	.0868*h*	.1632*h*	.0818	.0866	.1608
Philadelphia	150.00	62.00	4.06	19.00	.....	17.00*g*	.....	.08*h*	.....	.....	.....	.....
Pittsburgh	142.00	42.00	3.90	20.00	31.00	.10	.20	22.00	35.00	.08	.09	.18
St. Louis	.....	43.50	.....	16.50/17.00	22.50/23.00	15.50/16.00*g*	21.50/22.00*g*	.075/.08*h*	.165/.17*h*	.065/.07	.075/.095	.125/.155
San Francisco	.....	54.00*c*	.....	14.50	31.75*w*	14.50*g*	.....	15.00	.....	.....	.0575	.1275
Seattle	.....	.....	.....	14.50*i*	31.00*i*	13.00*ig*	.....	15.00*i*	19.00*mi*	14.00*i*	.0625*i*	.0725*i*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* F.o.b. Refinery. *c* 2¼ x 8¼ x 4 in. *d* 2-in. interior block, 6-lb. treatment. *e* 3½ x 4 x 8½. *f* 40-300 penetration. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* Shipped in drums. *k* Tax included. *l* Not used. *n* 55 gal. drums. *o* Price at plant. *p* Per 100 gal. *s* Drums not available. *t* Truck deliveries in Greater Cleveland. *w* Shipped in double head wood barrels. *x* Truck deliveries in Detroit $75.00. *y* Carload lots. *z* 50-300 penetration. *aa* In customer's drums. * Price ranges from $17.50 to $18.00. † Correction: Unchanged from Nov. price.

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES— PLATE*f*	REINF. BARS billet *bef*	RIVETS ½-in. structural*f*	WIRE NAILS Base *df*	SHEET PILING Base*f*	STEEL RAILS Per Net Ton Standard	Light	Re-rolled	TRACK SUPPLIES*f* Angle Bars	Std Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.80	$2.75	$5.65	$4.25/5.00		$55.00	$62.00	Not	$3.25	$4.85	$3.05	$7.00
Chicago	2.80	2.75	5.65	4.25/5.00	$3.30	.....	.....	avail-	3.25	4.85	3.05	7.00
Pittsburgh	2.80	2.75	5.65	4.35/5.00	3.30	55.00	62.00	able	3.25	4.85	3.05	7.00
Buffalo	2.80	2.75	.....	.....	3.30	.....	.....	.....	.....	.....	3.05	.....
Cleveland	.....	2.75	5.65	4.35/5.00	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.75	.....	.....	.....	.....	.....	.....	.....	4.85	.....	.....
Detroit	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Geneva	2.975‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles	3.41/3.47‡	3.325‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

‡ Delivered. *b* Rail steel price upon application. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports. On tie plates alone, Steelton, Pa.; on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per CL. *e* Mill lengths. Add 50*¢* for cut lengths. *f* Per 100 lbs.

IRON AND STEEL PRODUCTS—F. O. B. WAREHOUSE, PER 100 LBS., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb base price	REINFORCING BARS*g* Per 100 lb., base price *u* 5 tons to carload lot *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH*k* Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq. ft., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in., No. 6 & 6 wires	SHEET PILING Per 100 lb. base price
Atlanta	$5.02‡	$5.12‡	$5.12‡	$.025	$.10	$31.00	$33.00	$2.58	$1.78	$2.71	.....
Baltimore	4.68	3.96*l*	.....	.....	.10	33.50	35.50	2.41	1.67	2.53	$4.25
Birmingham	4.10	4.25	4.25	.05	.10	37.50*p*	40.50*p*	2.56	1.76	2.68	.....
Boston	4.92‡	4.65‡	4.096*a*	.....	.10/.15	29.00	31.00	2.49	1.72	2.62	3.753*k*
Chicago	4.40	3.65*ff*†	3.65*h*†	.05	.05	27.00‡	29.00‡	2.26	1.58	2.37	3.30*k*
Cincinnati	4.79‡	3.819*c*	3.819*c*	.....	.....	29.00*zeegg*	31.00*zeegg*	2.40	1.66	2.52	3.64*l*
Cleveland	4.65	3.54†*c*	.....	.....	.10	29.00	31.00	2.36	1.63	2.47	.....
Dallas	6.72	5.50†	5.50†	.....	.....	29.15	31.35	2.66	1.83	2.79	.....
Denver	5.28	5.80*c*	.....	.....	.....	40.00*s*	45.50*qs*	2.69	1.84	2.82	5.70
Detroit	4.77‡	4.73†	4.73†	.....	.10	33.00*x*	35.00*q*	2.40	1.66	2.52	3.6512*yd**
Kansas City	5.15*ee*	4.34†*aak*	4.34†*aak*	.....	.10	34.00	36.00	2.47	1.71	2.59	3.78*k*
Los Angeles	5.30*f*	4.43	.....	.....	.....	30.50	32.50	2.76	1.89	2.90	.....
Minneapolis	4.78‡	4.984*ccn*†	4.984*ccn*†	.....	.15	29.50*k*	31.50*k*	2.47	1.70	2.58	3.817*k*
Montreal	4.55*i*	4.20*i*	4.20*i*	.....	.....	36.00*h*	38.70*h*	2.54	1.75	2.66	73.00*jd*
New Orleans	.....	4.64*ok*	.....	.05	.10	27.50	29.50	2.54	1.75	2.67	.....
New York	4.52*r*	4.50	.....	.....	.15/.20	30.00*st*	32.00*st*	2.45	1.69	2.56	3.35*n*
Philadelphia	4.52	4.59†	.....	.....	.....	30.00‡	32.00‡	2.42	1.68	2.54	3.41
Pittsburgh	4.40	4.55†	4.55†	.05	.10	26.00	29.80	2.25	1.58	2.37	5.05
St. Louis	4.699‡	3.87*c*†	3.87*c*†	.....	.05	38.00‡	40.00‡	2.38	1.65	2.49	.....
San Francisco	5.10	4.53†	.....	.....	.....	32.50	34.50	2.76	1.89	2.90	4.85
Seattle	3.628*c*	4.58†*c*	.....	.....	.....	43.00*w*	46.00*w*	2.76	1.89	2.90	4.355*dd*

‡ Delivered. *a* Mill prices. *b* 1–5 tons, add 35*¢*. Less than 1 ton, add 50*¢*. *c* 20 tons or over base. *d* Mill price plus freight. *e* F.o.b. plant *f* Includes delivery in free delivery zone. *g* High scrap steel prices cut former 15c. differences between new billet and rail steel. *h* List price. Dominion tax exempt. Provincial and Municipal tax extra. *i* Plus Dominion, Provincial and Municipal sales tax. *j* Price per ton. *k* F.o.b. city. *l* Intermediate. *m* Per sq. yd. *n* 5 to 8 tons base. *o* 5 to 15 tons base. *p* Del. of 5000 sq. yd. or less. *q* Std. ribbed. 4 lb. per sq. yd. *r* 5 tons or over. *s* LCL. *t* Asphalt coated. *u* Note: Revised size extra—1 in., 1¼ in., 1½in. 10*¢*. ¾ in., ⅞ in. 15*¢*. ¾ in. 20*¢*. ¼ in. 35*¢*. ½ in. 55*¢*. ¼ in. $1.30. *v* Under 20 tons. Straight. *w* Copper bearing. *x* 2.5 lb. per sq. yd. *y* $.0093 transportation tax included. *z* Copper alloy. *aa* 20 tons base. *cc* F.o.b. cars Chic. plus freight. *dd* F.o.b. dock *ee* F.o.b. cars. *ff* Carload lots. *gg* Unchanged since Sept. comparable Aug. std. diamond mesh price was $26; std. ribbed, $28. † Price includes quantity charge and size charge of 15*¢* per cwt. for ⅛".

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in. *a*	VITRIFIED SEWER PIPE Per foot, Delivered ASTM C13–44T std. 8 in. s.s.	std. 12 in. s.s.	24 in.	36 in.	CLAY DRAIN TILE ASTM C4–24 Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTMC 14–41 12 in.	24 in.	WROUGHT STEEL PIPE** (Full standard weight, f.o.b. destination *ii*) 2½ & 3 in., Butt Weld Black %	Galv. %	3½ to 6 in., Lap Weld Black %	Galv. %
Atlanta	$79.78	$0.43	$0.67	$3.39	$7.00	$114.00	$140.00	$0.45	$2.00	50.7	36.2	46.7	31.7
Baltimore	84.10	.378	.729	3.105	8.098	147.00	228.00	.80	2.20	54.4	39.9	50.4	35.4
Birmingham	74.50	.375	.675	3.06	.....	210.00‡	375.00‡	.75	2.00	50.7	36.2	46.7	31.7
Boston	86.70	.392*acx*	.756*acx*	3.465*acy*	8.7125*acy*	150.60	233.40	1.03*gcc*	2.75*gcc*	52.7	38.2	48.7	33.7
Chicago	85.06	.54	1.04	4.12	12.80	150.00‡	270.00‡	.65	2.25	56.5*t*	42.0*t*	51.5*t*	36.5
Cincinnati	83.86	.406	.783	4.00	12.00	155.00‡	240.00‡	.60	2.25	54.9	40.4	50.9	35.9*t*
Cleveland	85.54	.329*x*	.6345*x*	2.79*x*	7.38*x*	135.50	212.00	.58	2.25	57.15	42.65	53.15	38.15
Dallas	87.28	.375	.675	2.70	6.20	109.00	131.00	.45	1.45	48.8	34.3	44.8	29.8
Denver	92.12	.38*dd*	.68*dd*	2.84*dd*	.....	.....	.....	.64*dd*	2.25*dd*	46.9	32.4	42.7	27.7
Detroit	85.54	.51	.98	4.31	10.79	170.00‡*m*	260.00‡*m*	.50	1.90	55.4	40.9	51.4	36.4
Kansas City	86.62	.39*m*	.705*m*	2.78*m*	6.85*m*	175.00*m*	310.00*m*	.50*l*	1.70*l*	52.2	37.7	47.8	32.8
Los Angeles	98.50	.414‡	.894‡	4.347	10.868	.....	.....	.65	.....	.....	.....	.....	.....
Minneapolis	90.00	.51*mo*	.98*mo*	3.95*mo*	.....	.....	.....	1.05*h*	2.90*h*	52.3	37.8	47.9	32.9
Montreal	78.20	.68*z*	1.20*z*	3.94*z*	6.38*ez*	.48*paa*	.68*paa*	72.00*jkaa*	218.00*jkhaa*	.....	.....	.....	.....
New Orleans	82.18	.40	.72	3.06	.....	220.00*bb*	.....	.55	1.95	50.3	35.8	46.3	31.3
New York	83.30	.59	1.09	4.24	10.79	.....	.....	1.00	2.25	53.7	39.2	49.7	34.7
Philadelphia	81.70	.50	.95	3.95	9.75	220.00‡	275.00‡	1.05*h*	2.75*h*	54.2	39.7	50.2	35.2
Pittsburgh	86.02	.357*m*	.6585*m*	2.70*m*	6.625*m*	126.20	197.40	1.05*h*	2.50*j*	57.5*t*	42.0*t*	53.5*t*	38.5*t*
St. Louis	83.38	.40	.72	2.88	6.53	.....	.....	1.10*il*	2.25*hl*	54.1	39.6	49.2	34.2
San Francisco	98.50	.438*d*	.878*d*	3.69*d*	9.23*d*	169.00*dl*	265.00*dl*	.69	2.85	.....	.....	.....	.....
Seattle	100.30	.45*b*	.81*b*	.....	.....	72.50*c*	.....	.595	1.80	.....	.....	.....	.....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, CL. Burlington, N. J., (base) $79.50. Based on existing freight rates; subject to rate change. Gas pipe and class A, $5 per ton additional. 4 in., $5 per ton additional. 30 in. and larger, usually $1 per ton less. *b* Extra strength ASTM C 200–44T. *c* 4-in. *d* SS361-A. *e* 30 in. *g* Culvert pipe. Reinforced, ASTM C76–41. *h* Reinforced. ASTM C75–41. *i* Reinforced. ASTM C76–37. *j* Centrispun. *k* Per 100 ft. *l* F.o.b. plant. *m* Truck delivery. *o* Listed price is based on LCL (no minimum). *p* Less than 5 ton loads, price per ft. *s* Discounts from standard list consumers carload prices. Base price approx. $200 per net ton. List prices per ft.: ¼ in., 8½c.; ½ in., 11c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92; 3 percent tax on transportation costs not included. *t* Within switching limits. *u* ASTM C13–40. *v* F.o.b. city. *x* 2 ft. lengths. *y* 3 ft. lengths. *z* CESA A60–1941 specifications used. *aa* No standard specifications in Can. *bb* Freight allowed to destinations in city. *cc* Truck loads; f.o.b. plant, Newton. *dd* LCL, delivered, f.o.b. truck. ** Recent 10% emergency freight rate increment granted railroads on Oct. 13 not included.

WROUGHT IRON PIPE: List prices per ft. same as wrought steel pipe. Discount for Pittsburgh base. Butt weld — 1 in. and 1¼ in. black, 34 galv., 16; 1½ in. black, 38 galv., 18½; 2 in. black, 37½ galv., 18. Lap weld — 2½ in. to 3½ in. black, 31½ galv., 14½ 4½ in. to 8 in. black, 32½ galv., 17. Freight rates to destination to be added to name delivered price.

LUMBER, TIMBER, PLYWOOD — PER M FT., B.M. CARLOAD LOTS F. O. B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)								LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment* (See note for base price)	
	1x6 s4s	1x8 s4s	2x4 s4s	2x6 s4s	2x8 s4s	2x10 s4s	3x12 s4s	6x12 s4s	12x12 s4s	2x12 s4s	12x12 s4s	⅜"	¾"
Atlanta	l **$72.00**	**$72.00**	**$62.00**	**$62.00**	**$62.00**	**$62.00**	**$82.00**					$20.46	$24.97
	l *85.00*	*85.00*	*95.00*	*95.00*	*95.00*	*95.00*	*85.50*	*$85.50*	*$85.00*				
Baltimore	**95.48**	**96.00**	**96.00**	**94.80**	**99.20**	**103.60**	**114.50**			193.60	181.50	20.96	25.58
	105.80	*108.00*	*112.30*	*111.20*	*114.00*	*114.00*	*121.00*	*121.00*	*121.00*				
Birmingham	l **87.50**	**87.50**	**87.00**	**86.00**	**87.00**	**90.00**	**110.00**			110.00	112.50	19.97	24.37
	l *92.50*	*92.50*	*92.00*	*91.00*	*92.00*	*95.00*	*114.00*	*97.00*	*98.00*				
Boston	86.00[3]	88.00[3]	86.00[3]	86.00[3]	88.00[3]	91.00[3]	98.00[3]					20.96	25.58
	89.00	*89.00*	*89.00*	*89.00*	*89.00*	*89.00*	*99.00*	*99.00*	*99.00*	*99.00*	*99.00*		
Chicago	‡ **100.00**	**104.00**	**93.00**	**93.00**	**93.00**	**100.00**	**100.00**			125.00	125.00	17.16	20.90
	‡ *108.00*	*108.00*	*100.00*	*100.00*	*100.00*	*103.00*	*105.00*	*105.00*	*105.00*				
Cincinnati	**89.00**	**91.00**	**90.00**	**88.00**	**90.00**	**92.00**				100.00	135.00	19.97	24.37
Cleveland	k **110.00**	**120.00**	**120.00**	**120.00**	**120.00**	**125.00**	**130.00**			130.00	130.00	20.35	24.86
	k *115.00*	*130.00*	*130.00*	*130.00*	*130.00*	*130.00*	*130.00*	*130.00*	*130.00*				
Dallas	l **68.00**	**68.00**	**58.00**	**55.00**	**57.00**	**62.00**	**57.00**			95.00	90.00	17.16	20.90
Denver	*95.00*	*95.00*	*96.50*	*96.50*	*96.50*	*96.50*	*105.00*	*110.00*				12.76	15.57
Detroit	**98.00**	**98.00**	**90.00**	**90.00**	**95.00**	**93.00**	**93.00**			90.00	105.00	19.97	24.37
	98.00	*98.00*	*92.00*	*92.00*	*98.00*	*95.00*	*100.00*	*100.00*	*105.00*				
Kansas City	b **105.00**	**110.00**	**105.00**	**105.00**	**105.00**	**105.00**	**110.00**			125.00		15.18	18.48
	b *105.00*	*110.00*	*110.00*	*110.00*	*110.00*	*110.00*	*115.00*	*110.00*	*115.00*				
Los Angeles	a *108.00*	*108.00*	*108.00*	*102.00*	*102.00*	*102.00*	*105.00*	*115.00*	*105.00*			12.27*gh*	14.91*gh*
Minneapolis	‡b 112.00[3]	112.00[3]										15.18	18.48
	‡b *108.00*	*108.00*	*108.00*	*108.00*	*108.00*	*110.00*	*130.00*	*130.00*	*130.00*				
Montreal	c[3] 69.00	70.00	64.00	68.00	70.00	75.00							
	97.00	*97.00*	*97.00*	*97.00*	*97.00*	*97.00*	*87.00*	*87.00*	*87.00*				
New Orleans	l **60.00**	**60.00**	**60.00**	**60.00**	**60.00**	**65.00**	**105.00**					17.16	20.90
	l *61.00*	*61.00*	*58.50*	*58.50*	*58.50*	*54.50*	*60.00*	*60.00*					
New York	‡ **105.110**	**105.110**	**Range from $95.00 to $99.00**				**120.00**					20.96	25.58
	‡		*Range from $115.00 to $125.00*				*115/125*	*115/125*	*115/125*				
Philadelphia	**110.00**	**110.00**	**110.00**	**110.00**	**110.00**	**110.00**	**110.00**			150.00	150.00	20.96	25.58
	120.00	*120.00*	*120.00*	*120.00*	*120.00*	*120.00*	*120.00*	*120.00*	*120.00*				
Pittsburgh	l **59.40**	**61.80**	**71.85**	**63.60**	**69.45**	**73.10**	**89.85**			130.60	141.00	20.68	25.19
	l *77.60*	*76.70*	*74.70*	*73.90*	*73.80*	*74.85*	*91.35*	*96.85*	*96.96*				
St. Louis	‡j **105.00**	**105.00**	**100.00**	**100.00**	**105.00**	**105.00**	**115.00**	*140.00*	*140.00*			17.16	20.90
	‡j *115.00*	*115.00*	*120.00*	*120.00*	*120.00*	*120.00*	*125.00*						
San Francisco	d *76.50*	*76.50*	*76.50*	*76.50*	*76.50*	*74.50*	*74.00*	*74.00*	*74.00*			9.24*g*	11.28*g*
Seattle	l *70.00i*	*70.00i*	*70.00i*	*70.00i*	*70.00i*	*70.00i*	*75.00i*	*75.00i*	*75.00i*				

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [3] Spruce. [4] Western Pine, No. 3 Common. [3] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Retail prices, less than CL. *c* 5 M ft. or less. *d* Direct mill prices; f.o.b. purchaser's carrier or truck. *e* Tax exempt. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* No. 1 common. *j* Delivered in 5000 ft. lots. *k* These are retail yard prices quoted per truckload in Greater Cleveland. Less 2% for cash. Truck lots. *l* F.o.b. mill.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ⅜", $151.00; on ½", $171.00. For other centers add rail freight increment from table on proper size. For oiling add $3.00; for edge sealing add $2.00; for resin sealing add $8.50.

* Freight rates include 10% emergency increase granted railroads on Oct. 13.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discount from jobbers list, Jan. 16, 1946*a* Single or Double Thickness A quality	B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50 lb. cases delivered in 200 lb. lots*	
Atlanta	76%	76%	$0.195	
Baltimore	70–10%	71–10%	.195	
Birmingham	68%	68%	.15	
Boston	77%	78%	.195	
Chicago	68%	68%	.195	
Cincinnati	67&10%*e*	67&10%*e*	.195	
Cleveland	67–10–10%	67–10–10–10%	.235	
Dallas	67%	68%	.2075	
Denver	68%	68%	.20	
Detroit	77%	76%	.195	
Kansas City	68.10%*e*	68.10%*e*	.20	
Los Angeles	63%	68%*f*	.2025	
Minneapolis	68%	68%	.20	
Montreal	40–5%*bc*	40–10–5%*bc*	....	
New Orleans	68%	68%	.205	
New York	73%	74%	.265*g*	
Philadelphia	69%	70%	.195	
Pittsburgh	77–10%	77–10%	.1675	
St. Louis	70–10%	70–10%	.20	
San Francisco	66%	73%	.20	
Seattle	59%	60%	.2025	

Price of 60% Ammonia Gelatin is $0.0125 per lb. higher than 40%

Glass: a Jobbers list price per box, 14x20, ss, $20.75 for A quality, $18.00 for B quality; 14x20, ds, $30.75 for A quality, $26.00 for B quality. *b* Discount from list, Sept., 1939; sales tax included, but 6% tax exemption not allowable for. *c* Single thickness. *e* Discount from list of Aug. 15, 1938. *f* ss; ds — 67%.

Explosives: * Urban prices influenced by service charges or local storage and delivery regulations do not consistently reflect quantity prices in less congested areas. *g* In borough of Kings, Queens and Richmond, and in Manhattan south of Canal St., add delivery charge of $9.00 per trip.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.15	$0.175	$0.195
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.155 –.1625	.18 –.1925	.20 –.2125
Rocky Mtn. States	.155 –.1675	.18 –.1975	.20 –.2175
Pacific N. W. States	.1525–.165	.1825–.195	.2025–.215
Pacific S. W. States	.15 –.1575	.18 –.1875	.20 –.21

PILES, TIES F. O. B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail — Pine*	Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.34	....
12-in.— 2-ft. from butt	6-in.	50 to 59-ft.	.35	....
12-in.— 2-ft. from butt	6-in.	60 to 69-ft.	.36	....
12-in.— 2-ft. from butt	6-in.	90 to 100-ft.	....	.57
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	.62
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.41	.69
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.43	.61
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.54	.63
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	.57	.64
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	.68

* Pine piling over 80-ft. available only in limited quantities.

RAILWAY TIES

Prices f.o.b. per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.45	....	$2.00	....
	Pine	1.35	$3.05*a*	1.90	$4.00*a*
New York	S. L. Sap Pine	1.65	2.85	2.00	3.30
	Mixed Oak	1.80	3.05	2.50	3.60
Birmingham	Hardwood	1.00	1.60*a*	....	2.25*a*
Chicago	Red Oak	....	2.35/2.40*a*	....	3.25/3.40*a*
Los Angeles	Douglas Fir	2.10	3.35*a*	3.00	4.80*a*
Philadelphia	Red Oak	2.25	3.05*ag*	3.00	4.15*ag*
St. Louis	White Oak	1.80	....	2.50	....
	Red Oak	....	2.40*a*	....	3.40*a*
	Sap Pine or Cypress	2.20	....	....	....
San Francisco	Douglas Fir	1.50*ef*	2.70*f*	2.00*bf*	3.78*caf*
Montreal	Birch or Maple	.... *h*	.... *h*	.... *h*	.... *h*

Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 7" x 9" x 8'. *c* Empty cell. *e* Green. *f* F.o.b. cars. *g* January, 1943 price, none later available. *h* No constant price available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder in drums f.o.b. works, per 100 lb	$3.75
Chlorine cylinders, liquid, per lb. delivered	.07–.12
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, del'd, ton	21.50–38.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.55
Soda ash, 58%, in paper bags, per 100 lb. dense	1.38
Sulphate of aluminum, commercial, in 100-lb. bags	1.15–1.30
Sulphate of copper, in bgs., per 100 lb	7.60

Pages from the Blue Book of American Industry

Fisher Body Cleveland Division General Motors Corp.

Architects and Engineers: McGeorge-Hargett & Associates
General Contractors: Albert M. Higley Co.
Roof Area, 600,000 sq. ft.
Roofed by "Industrial"

INDUSTRIAL ROOFING and SHEET METAL, Inc.
HEnderson 6868

THE FIRMS WE SERVE

- Ajax Manufacturing Co., The
- Aluminum Co. of America
- American Steel & Wire Co.
- American Fork & Hoe Co.
- Bartlett & Snow Co., The C. O.
- Brewing Corporation of America
- Champion Machine & Forging Co.
- Chase Brass & Copper Co., Inc.
- Chevrolet Div., General Motors Corp. Cleveland, O.
- Cleveland Graphite Bronze Co.
- Cleveland Pneumatic Aerol, Inc.
- Cleveland Pneumatic Tool Co., The
- Electro Metallurgical Co.
- Fawick Airflex Co., Inc.
- Fisher Body Cleveland Division General Motors Corp.
- Fruehauf Trailer Co., Avon, Ohio
- General Electric Co.
- General Motors Proving Ground Milford, Mich.
- Industrial Rayon Corp.
- Jack & Heintz Precision Industries
- Jones & Laughlin Steel Corp.
- Linderme Tube Co.
- Midland Steel Products Co.
- National Screw & Mfg. Co.
- National Tube Division United States Steel Corp. Lorain, Ohio
- New Departure Division General Motors Corp., Sandusky, Ohio
- New York Central System
- Nickle Plate Railroad
- Ohio Crankshaft Co.
- Ohio Bell Telephone Co.
- Ohio Gear Co.
- Ohio Rubber Co.
- Republic Steel Corp.
- Ridge Tool Co., Elyria, Ohio
- Thompson Aircraft Products Co.
- Thompson Products Inc.
- U. S. Air Compressor Co.
- U. S. Steel Supply Division of U. S. Steel Cleveland, O.
- Warner & Swasey Co.
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In case after case, on many well known construction jobs, "Industrial's" *EN*genuity was the deciding factor in keeping roof application costs to a minimum.

Perhaps "Industrial" can help keep roof costs in line on your jobs. Have us quote.

INDUSTRIAL ROOFING AND SHEET METAL INC.

4815 LEXINGTON AVE., CLEVELAND, OHIO

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity Common backing	Straight hard	LIME Per ton. In paper, Carload lot, Hydrated finishing	Common hydrated	Pulverized, or lump
Atlanta	.....	.....	.....	.....	.....	.....	$24.00	$24.00	$19.00	$17.50	$17.50
Baltimore	$120.00	$126.00	$220.00	$240.00	$315.00	$340.00	27.00*k*	32.00*k*	30.00	18.00	
Birmingham	97.50	104.00	195.00	231.00	.....	.....	20.00*ff*	22.50*gg*	21.80	17.50	
Boston	105.00†	112.00†	210.00†	252.09†	.....	.....	20.00*a*	20.00*a*	21.00†		16.00
Chicago	115.00	122.50	230.00	.....	.....	.....	20.00	21.00	25.00	18.00	
Cincinnati	120.00*j*	135.00*j*	170.00*dd*	280.00*j*	.....	.....	33.00	33.00	25.60	23.20	
Cleveland	107.50*cc*	114.50*cc*	210.50*cc*	.....	.....	.....	25.50	25.50	21.15	19.15	23.25*cc*
Dallas	.....	83.00	.....	.....	.....	.....	18.00	20.00	28.00	22.00	
Denver	.....	.....	.....	.....	.....	.....	26.00	31.00	34.80*bb*	28.00*bb*	34.00*bb*
Detroit	130.00	145.00	260.00	300.00	380.00	443.30	27.00*ff*	29.00*f*	28.00	26.00	26.00
Kansas City	.....	.....	.....	.....	.....	.....	16.00	18.50	34.00	30.00	30.00
Los Angeles	*r*	*r*	*r*	*r*	*r*	*r*	24.00	.....	26.00	26.00	27.00
Minneapolis	144.00*p*	160.00*p*	.....	160.00*wp*	.....	.....	23.50*cp*	.....	33.00*bb*	24.00*bb*	33.00*bb*dd
Montreal	92.50*a*	98.50*a*	196.25*a*	151.50*ag*	.....	294.40*a*	22.16	31.86	12.50*ab*	14.00*a*	8.00*aa*
New Orleans	160.00	160.00	300.00	380.00	411.89	485.91	22.50	.....	21.20	18.00	14.10
New York	103.90	110.80	152.35*c*	166.70*hh*	.....	.....	28.00	.....	33.50	25.50	.....
Philadelphia	112.10	119.60	224.20	269.10	321.20	405.10	24.75	27.75	26.75	17.00	17.00
Pittsburgh	98.50	105.80	181.85	217.30	265.85	303.10	26.00	28.00*y*	19.40	16.90	2.85*m*
St. Louis	106.92	118.00	220.00	231.50	275.00	319.20	28.50*al*	26.50*s*	.72*aap*	.55*aap*	.82*aapee*
San Francisco	124.00	139.50	186.00*dd*	139.50*t*	.....	.....	27.50	.....	23.10	23.10	2.31*m*
Seattle	137.00*cc*	147.00*cc*	.....	147.00*ccw*	.....	.....	28.50	33.50	27.95*ahh*	27.95*ahh*	3.28*mhh*

† F.o.b. *a* Smooth. *b* Per 50 lb. bags *c* 6 x 12 x 12 in.-3 cell. *d* Pulverized hot *e* 5% discount for cash. *f* Includes $3.50 per M for truck delivery. *g* 5½ x 8 x 12. *h* F.o.b. Perth Amboy, N.J. *i* F.o.b. warehouse only. *j* Truck load or over. *k* $1.00 discount. *l* Red face. *m* Per bbl., 180 lb. *n* 7¾ x 7¾ x 12. Speed tile. *o* Per bbl., 200 lb. *p* Truck lots. *r* Not used because of earthquake danger. *s* 2% discount for cash. *t* 5½ x 8 x 11½. *u* Ta[x] exempt. *v* Sand lime. *w* 5 x 8 x 12. *y* Stacked. *z* Pebble lime price per 80 lb. sack. *aa* Price per sack. Lime not sold per ton. *bb* LCL. *cc* Truck delivery. *dd* 6 x 12 x 12. *ee* Pebble lime. *ff* 80% common. *gg* Select. *hh* LCL.

PAINT, ROOFING—F. O. B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in 100 lb. cases In oil *w*	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *c*	Ferric Oxide *d*	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 360 lb. bbl. per ton
Atlanta	$18.85	$27.375	$1.75	$2.70	$1.65	$2.06‡	$2.06‡	$2.06‡	$1.00‡	$36.00‡
Baltimore	18.60	27.00	2.25	3.50	2.75	2.50	3.00	3.00	.50	30.00
Birmingham	18.85	27.375	4.40	4.52	....	2.84	2.70	2.70	.40	34.50
Boston	18.60	27.00	1.75	2.50	2.31	2.00‡*h*	3.30‡*q*	3.30‡*q*	.25‡	21.00
Chicago	18.60	27.00	....	....	....	2.50‡	2.63‡*o*	2.65‡*o*	31.00†*bb*	31.00‡
Cincinnati	18.60	27.00	....	3.15	1.90	2.21	2.26*o*	2.26*o*	.37	34.00
Cleveland	18.60	27.00	3.00	3.00*a*	3.00	2.21	2.26*o*	2.26*o*	.31*y*	33.00
Dallas	18.60	27.00	....	4.05	....	2.69*q*	3.00*q*	3.15*q*	.90	45.00
Denver	18.60	27.50	2.88	4.38	2.63	2.04*o*	2.24*o*	....	.42	32.00
Detroit	18.60	27.00	2.25	3.00	2.00	2.25	2.25	2.25	.50	25.00
Kansas City	18.60	27.125	3.30*g*	3.55*g*	3.16*g*	3.00	3.25	3.50	.54	.....
Los Angeles	18.85	27.50	2.80	4.00	3.50	2.98	2.19*e*	*l*	.77	*l*
Minneapolis	18.60	26.13*m*	....	....	....	2.10*im*	2.15*him*	2.15*him*	.37*m*	28.00*rm*
Montreal	.....	17.85	2.90*p*	4.20*p*	3.62*p*	2.85*t*	2.58*tf*	2.07*tf*	.68*t*	1.85*kt*
New York	18.60	27.00	3.45	....	3.45	2.10	2.15*o*	2.15*o*	.30*z*	26.00
Philadelphia	18.60	27.00	1.75/2.00	2.40	1.70	2.54	2.94	2.94	.37	26.00
Pittsburgh	18.60	27.00	2.05	2.50	1.90	2.32	2.37*o*	2.37*o*	.37	32.00
St. Louis	18.60	27.00	....	....	....	2.66	2.66	2.66	.38	31.00
San Francisco	18.85	27.25	1.80	2.75*n*	1.35	2.27*x*	3.30*aa*	....	.38*g*	.....
Seattle	18.85	27.50	2.95*m*	2.95*m*	....	3.00*mqcc*	3.07*hmcc*	....	.48*mcc*	35.00*mcc*

‡ Delivered. Note: Red lead in oil 50c higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* 15 lb. per square. *f* Per 432 sq. ft. *g* 50 gal. drums. *h* Per roll. 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per cwt. *l* Not used. *m* 1% discount for cash. *n* May, 1941 price. *o* Per 60-lb. roll. *p* Tax included. *q* Per 90-lb. roll. *r* F.o.b. factory Chicago. *s* ASTM Spec. D266-41. *t* Federal tax included. *w* Price to large paint contractors is $1.25 less. *x* Mineral surfaced. *y* 55-gallon container. *z* Drums. *aa* Approximate cost per 100 lbs. *bb* Roofers coating and cement. Price per ton. *cc* LCL.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Electrical Workers	Steamfitters	Common Labor Building	Common Labor Heavy Const.
Atlanta	$2.25	$1.65	$2.00	$2.00	$2.00	$1.80	$2.00	$0.75	$0.85
Baltimore	2.50	1.95	2.15	2.20/2.40	2.00	2.00	2.00	1.10	1.10
Birmingham	2.25	1.625	1.90	1.60/1.875	2.00	2.00	2.00	.85	.95
Boston	2.15	1.90	2.00	2.25	2.25	2.15	2.00	1.40	1.40
Chicago	2.20	2.15	2.20	2.15	2.225	2.15	2.15	1.50	1.50
Cincinnati	2.25	1.975	2.10	2.00	2.125	2.125	2.125	1.25	1.15
Cleveland	2.25	2.125	2.25	1.875/2.125	2.125	2.125	2.125	1.55	1.40
Dallas	2.25	1.875	2.00	2.00	2.125	2.00	2.125	.95	.95/1.50
Denver	2.25*b*	1.875	1.875*b*	1.875*b*	2.25	2.05	2.05	1.275	1.35
Detroit	2.25	2.025	2.25	2.25	2.25	2.25	2.165	1.425	1.425
Kansas City	2.25	1.90	2.05	2.125	2.25	2.025	1.875	1.35	1.40
Los Angeles	2.375	1.90	2.10	1.85	2.25	2.15	2.25	1.35	1.35
Minneapolis	2.075	1.80	2.00	1.85	2.25	2.06	2.00	1.30	1.30
New Orleans	1.9375	1.625	1.875	1.75	1.875	2.00	2.05	.90	.90
New York	2.75*b*	2.50*b*	2.75	2.75*b*	3.00*a*	2.25*a*	2.75*b*	1.50	1.50
Philadelphia	2.40/2.50	2.00	2.40	2.25	2.25	2.25	2.25	1.10	1.10
Pittsburgh	2.50	2.25	2.25	2.40	2.25	2.25	2.25	1.30	1.30
St. Louis	2.50	2.20	2.25	2.40	2.25	2.25	2.25	1.35	1.50
San Francisco	2.25	2.00	2.25	2.00	2.25	2.25	2.25	1.40	1.40
Seattle	2.365	2.065	2.265	1.95	2.235	2.135	2.345	1.665	1.50
Montreal*	1.40	1.06	1.11	1.00	1.17	1.11	1.11	.73	.67

6 Hr. day. *b* 7 hr. day. * Cost of living bonus now included in basic wage.

MEXICO CITY PRICES

In Pesos, f.o.b. City		July '47	Dec. '47
Common Wages—Building (8 hr. day)	av. per hr.	$ .57	$ .57
Common Wages—Heavy Const. (8 hr. day)	av. per hr.	.75	.75
Skilled Labor Wages			
Carpenters (8 hr. day)	av. per hr.	1.25	1.25
Bricklayers (8 hr. day)	av. per hr.	1.25	1.25
Struct. Iron Workers (8 hr. day)	av. per hr.	1.50	1.50
Struct. Steel Shapes 3"-15" x 12 meters	per ton	850.00	800.00
Reinf. Steel, Corr. Rods ⅜" x 12 meters	per ton	940.00	1,000.00
½" x 12 meters	per ton	895.00	955.00
⅝" x 12 meters	per ton	880.00	940.00
¾" x 12 meters	per ton	880.00	940.00
⅞" x 12 meters	per ton	870.00	930.00
1" x 12 meters	per ton	865.00	925.00
Gravel, truck load of 3½ cu. meters			
Blue Gravel	per tr. load	35.00	33.00
Rose Gravel	per tr. load	32.00	32.00
Cement, Std. Port. (Tolteca)	per ton	120.00	115.00
Lumber			
Mex. Sacred Fir (Oyamel)	per M ft.	375.00	370.00
1st Class Pine	per M ft.	750.00	700.00
2nd Class Pine	per M ft.	450.00	500.00

ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $2.135. **ENR Common Average:** $1.272

Men who know the ropes take Tiger Brand EXCELLAY PREFORMED every time!

● Yes, the Big Demand is for TIGER BRAND . . . because U·S·S American TIGER BRAND is famous for its smooth, trouble-free performance and long, low-cost service life.

Made of uniformly high quality steel wire to close tolerances, TIGER BRAND gives you strength, toughness and flexibility . . . *in the right combination* . . . to stand up tirelessly under the most difficult working conditions. You'll find this more supple rope easier and safer to handle, too. It has less tendency to kink and snarl . . . advantages which save time, trouble, and money any way you figure them!

Your wire rope supplier can give you immediate delivery on any amount of TIGER BRAND you need. Anticipate your requirements. Keep plenty of this dependable wire rope on hand. Don't get caught with your lines down.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
UNITED STATES STEEL

USS AMERICAN TIGER BRAND WIRE ROPE UNITED STATES STEEL

EXCELLAY PREFORMED

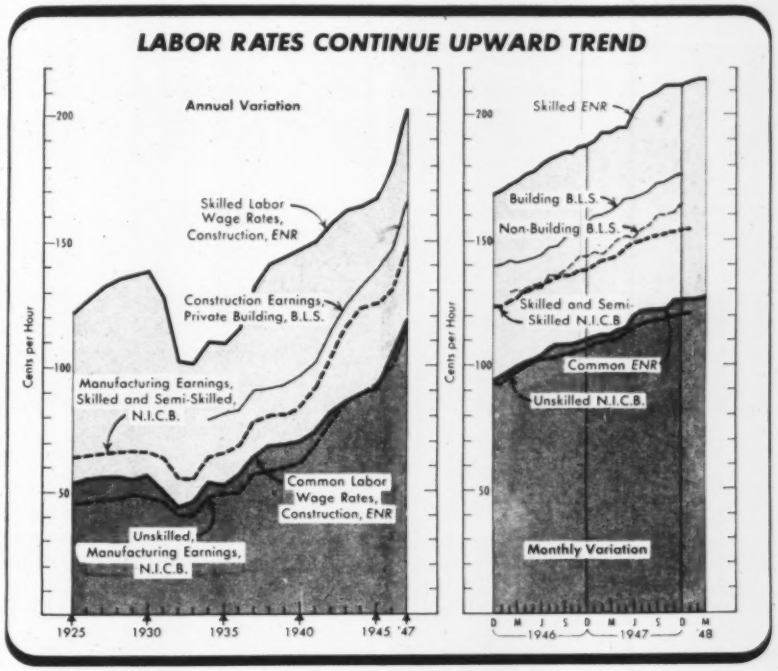
THE BIG DEMAND IS FOR TIGER BRAND

Construction Wage Rates and Trends

Average straight-time hourly wage rate for skilled construction labor was $2.14 in December, 1947, 14 percent above the December, 1946 average of $1.87 per hour, as reported by *Engineering News-Record*. The average wage rate of common labor showed an increase of 17 percent, rising to $1.272 per hour in December, 1947 from $1.085 in December, 1946. Wages continued upward through May, 1948. Skilled rate rose to $2.18, common to $1.315.

Hourly earnings on private construction projects, as reported by the Bureau of Labor Statistics, showed a gain of 13 percent for building and 15 percent for non-building projects from December, 1946 to December, 1947. Average earnings on building projects rose to $1.777 per hour at the end of 1947 from $1.569 at the end of 1946, and non-building earnings rose to $1.645 from $1.434.

The hourly earnings of manufacturing workers, as computed by the National Industrial Conference Board, showed a similar trend. Skilled and semi-skilled earnings rose to $1.541 per hour in December 1947 from the December 1946 rate of $1.376, a gain of 12 percent. Unskilled earnings rose 13 percent for a similar period from $1.061 to $1.203.



B.L.S. CONSUMERS' PRICE INDEX (1935–1939 = 100)

	1941	1942	1943	1944	1945	1946	1947	1948
January	100.8	112.0	120.7	124.2	127.1	129.9	153.3	168.8
February	100.8	112.9	121.0	123.8	126.9	129.6	153.2	167.5
March	101.2	114.3	122.8	123.8	126.8	130.2	156.3	166.9
April	102.2	115.1	124.1	124.6	127.1	131.1	156.1	.....
May	102.9	116.0	125.1	125.1	128.1	131.7	156.0	.....
June	104.6	116.4	124.8	125.4	129.0	133.3	157.1	.....
July	105.3	117.0	123.9	126.1	129.4	141.2	158.4	.....
August	106.2	117.5	123.4	126.4	129.3	144.1	160.3	.....
September	108.1	117.8	123.9	126.5	128.9	145.9	163.8	.....
October	109.3	119.0	124.4	126.5	128.9	148.6	163.8	.....
November	110.2	119.8	124.2	126.6	129.3	152.2	164.9	.....
December	110.5	120.4	124.2	127.0	129.9	153.3	167.0	.....

Construction Wages—Rates per Hour

20-CITIES AVERAGE REPORTED BY ENGINEERING NEWS-RECORD

CONSTRUCTION WAGES

	Skilled Aver.†	Common
1910	$0.525	$0.179
1911	.534	.179
1912	.542	.182
1913	.555	.19
1914	.565	.177
1915	.57	.182
1916	.58	.192
1917	.61	.281
1918	.68	.38
1919	.78	.466
1920	1.05	.579
1921	1.06	.54
1922	1.01	.442
1923	1.10	.518
1924	1.19	.555
1925	1.22	.538

Notes:

† *ENR* Skilled Average represents rates for bricklayers, carpenters, ironworkers.

M1 Skilled and Semi-skilled Manufacturing.
M2 Unskilled Mfg.
Both represent earnings per hour as reported by N. I. C. B.

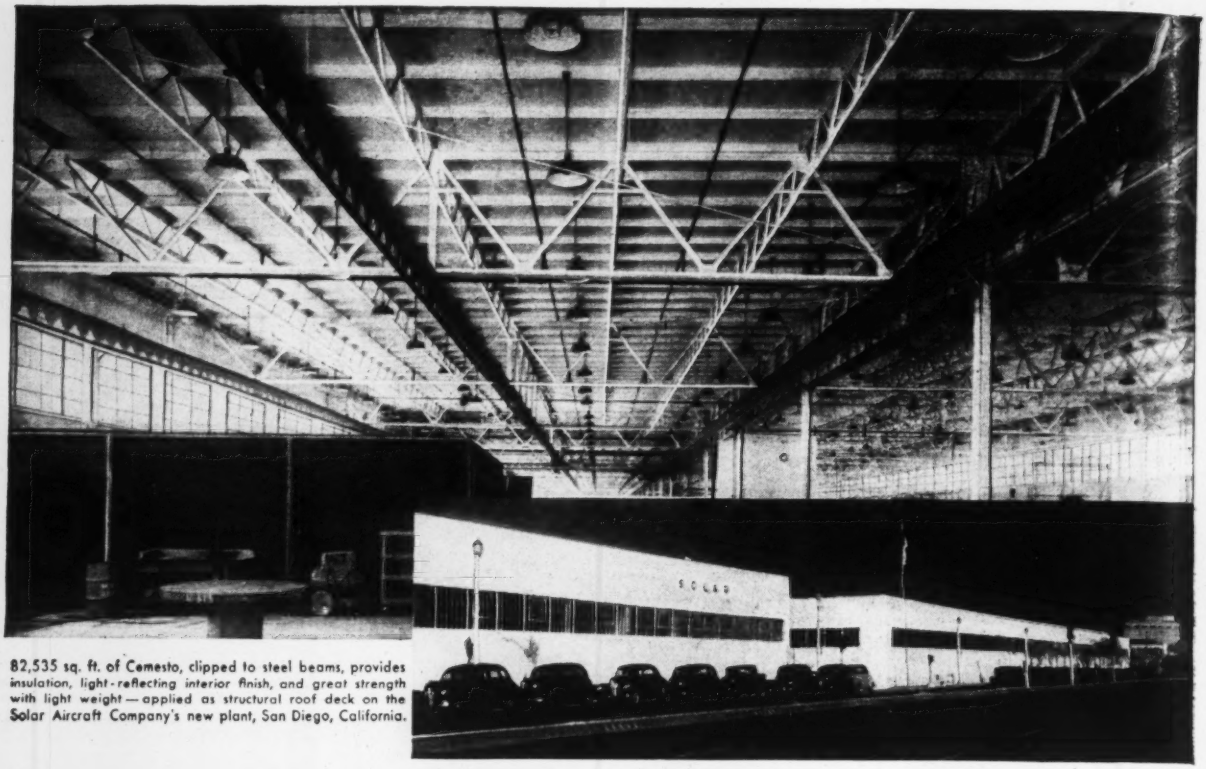
* Checked monthly. Reported in *ENR* each month.

SKILLED LABOR †* (Dollars per Hour)

	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
J	$1.24	$1.28	$1.34	$1.35	$1.37	$1.37	$1.15	$0.989	$1.054	$1.108	$1.119	$1.22	$1.39	$1.43	$1.47	$1.47	$1.53	$1.61	$1.62	$1.64	$1.70	$1.90	$2.14
F	1.24	1.32	1.34	1.35	1.38	1.37	1.11	.996	1.062	1.104	1.119	1.24	1.39	1.43	1.47	1.47	1.54	1.61	1.62	1.64	1.73	1.92	2.15
M	1.24	1.32	1.34	1.35	1.38	1.36	1.11	.991	1.069	1.092	1.132	1.25	1.40	1.43	1.47	1.47	1.54	1.61	1.62	1.64	1.74	1.92	2.15
A	1.25	1.30	1.35	1.35	1.38	1.36	.95	.997	1.084	1.093	1.134	1.26	1.40	1.44	1.47	1.48	1.54	1.61	1.63	1.65	1.76	1.93	2.17
M	1.26	1.31	1.36	1.35	1.38	1.36	.96	.998	1.101	1.081	1.138	1.30	1.40	1.44	1.47	1.49	1.54	1.61	1.63	1.65	1.77	1.94	2.18
J	1.27	1.33	1.35	1.36	1.38	1.32	.99	.994	1.001	1.074	1.138	1.33	1.41	1.44	1.47	1.49	1.55	1.61	1.64	1.66	1.80	2.02	....
J	1.27	1.33	1.35	1.36	1.38	1.23	1.00	.985	1.104	1.077	1.159	1.35	1.43	1.44	1.48	1.50	1.56	1.62	1.64	1.66	1.82	2.07	....
A	1.28	1.34	1.35	1.37	1.39	1.19	.98	.986	1.110	1.008	1.158	1.37	1.43	1.44	1.48	1.50	1.59	1.62	1.64	1.67	1.83	2.08	....
S	1.28	1.34	1.35	1.37	1.39	1.19	.99	1.016	1.119	1.088	1.159	1.37	1.43	1.44	1.48	1.52	1.59	1.62	1.64	1.67	1.84	2.10	....
O	1.29	1.33	1.35	1.37	1.39	1.17	.98	1.029	1.120	1.104	1.176	1.38	1.43	1.44	1.48	1.52	1.59	1.62	1.64	1.67	1.85	2.13	....
N	1.29	1.34	1.35	1.37	1.39	1.16	.97	1.037	1.120	1.101	1.178	1.38	1.43	1.46	1.48	1.52	1.60	1.62	1.64	1.68	1.86	2.13	....
D	1.29	1.33	1.35	1.37	1.39	1.15	.98	1.062	1.120	1.101	1.180	1.39	1.43	1.46	1.48	1.52	1.60	1.62	1.64	1.68	1.87	2.14	....
Av.	**1.27**	**1.32**	**1.35**	**1.36**	**1.38**	**1.27**	**1.02**	**1.006**	**1.097**	**1.093**	**1.149**	**1.32**	**1.41**	**1.44**	**1.47**	**1.50**	**1.56**	**1.615**	**1.634**	**1.66**	**1.80**	**2.02**	....
M1	.651	.656	.659	.668	.662	.634	.559	.55	.642	.662	.685	.78	.80	.81	.83	.916	1.044	1.163	1.227	1.248	1.321	1.478	....

COMMON LABOR * (Dollars per Hour)

	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
J	.54	.55½	.55	.559	.5628	.5384	.4524	42.71	.5158	.5376	.547	.603	.680	.682	.685	.711	.776	.832	.869	.891	.952	1.110	1.272
F	.54	.55½	.54½	.564	.5628	.5428	.4521	.4285	.5268	.5241	.547	.603	.675	.680	.685	.713	.780	.832	.869	.891	.968	1.118	1.272
M	.54½	.56	.54½	.5509	.5610	.5371	.4358	.4272	.5268	.5243	.547	.612	.675	.680	.685	.716	.780	.842	.870	.895	.988	1.118	1.283
A	.54½	.56	.55	.529	.5646	.5359	.4122	.4343	.5343	.5255	.552	.612	.677	.683	.685	.725	.788	.858	.874	.904	1.004	1.133	1.287
M	.55	.55½	.55	.5315	.5628	.5394	.4105	.4442	.5343	.5233	.558	.627	.673	.682	.690	.741	.788	.863	.873	.909	1.018	1.140	1.315
J	.55	.55½	.55½	.534	.5628	.5394	.4121	.4393	.5343	.5269	.564	.644	.677	.684	.703	.747	.796	.863	.877	.916	1.034	1.185	....
J	.55½	.55½	.55½	.5296	.5615	.4721	.4114	.4430	.4430	.5289	.563	.662	.677	.684	.707	.753	.802	.863	.882	.916	1.058	1.233	....
A	.55½	.55½	.5607	.5353	.5615	.4634	.4220	.4430	.5300	.5285	.569	.668	.677	.685	.707	.753	.823	.869	.882	.916	1.071	1.237	....
S	.55½	.55½	.5607	.5496	.5609	.5665	.4308	.4524	.5349	.5285	.569	.673	.677	.685	.711	.761	.823	.869	.883	.917	1.072	1.237	....
O	.55	.54½	.5628	.5496	.5596	.4584	.4308	.5057	.5363	.5285	.583	.676	.682	.685	.711	.761	.826	.869	.886	.917	1.073	1.263	....
N	.55½	.54½	.5653	.5603	.5587	.4559	.4260	.5102	.5388	.5275	.583	.678	.682	.685	.711	.768	.832	.869	.886	.917	1078	1.265	....
D	.55½	.55	.5628	.5653	.5503	.4534	.4273	.5202	.5413	.5275	.586	.678	.682	.685	.711	.769	.832	.869	.890	.938	1.085	1.272	....
Av.	**.548**	**.554**	**.5558**	**.5465**	**.5607**	**.5002**	**.4269**	**.4562**	**.5319**	**.5276**	**.564**	**.645**	**.678**	**.683**	**.699**	**.743**	**.804**	**.853**	**.879**	**.910**	**1.033**	**1.193**	....
M2	.461	.472	.474	.486	.478	.451	.401	.401	.478	.494	.498	.568	.584	.594	.61	.682	.774	.854	.892	.917	1.015	1.147	....



82,535 sq. ft. of Cemesto, clipped to steel beams, provides insulation, light-reflecting interior finish, and great strength with light weight — applied as structural roof deck on the Solar Aircraft Company's new plant, San Diego, California.

What's behind the rush to Cemesto?

Three important facts are spurring the great demand for Cemesto for industrial building—

IT'S MODERN: Cemesto is a *multi-function* material . . . a fire-and-moisture resistant asbestos cement wall unit with a cane fibre core . . . combining high thermal insulation with great structural strength in an integrated material that permits erection of industrial buildings with light-weight economical "curtain" walls, partitions, and roof decks.

IT'S PERMANENT: For 17 years industrial buildings have demonstrated that Cemesto's durable exterior and interior finish requires no painting, and little maintenance. Cemesto's core is Ferox*-treated against dry rot, fungus growth, and termites.

IT'S AVAILABLE: Cemesto is available NOW . . . for prompt delivery.

You are invited to write today for details on Cemesto applications in which you are interested. In the meantime, you'll find complete specifications on Cemesto in Sweet's File, Section 10a/7.

*REG. U. S. PAT. OFF.

THE CELOTEX CORPORATION, CHICAGO 3, ILLINOIS

CEMESTO
REG. U. S. PAT. OFF.

FOR ROOF DECKS···"CURTAIN" WALLS···PARTITIONS···OTHER INDUSTRIAL USES

Yearly Average WAGES OF SIX BUILDING TRADES in Seven Cities

Bricklayers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.65	$0.70	$0.75	$0.70	$0.70	$0.875	$0.75
1914-15	.65	.75	.75	.70	.75	.875	.75
1916	.65	.75	.75	.70	.75	.875	.75
1917	.70	.75	.75	.70	.75	.875	.81
1918	.80	.81	.75	.875	.85	1.00	1.00
1919	.80	.875	.875	.875	1.00	1.125	1.125
1920	1.00	1.25	1.25	1.00	1.25	1.25	1.25
1921	1.00	1.25	1.25	1.00	1.25	1.25	1.125
1922	1.00	1.25	1.10	1.00	1.25	1.25	1.125
1923	1.25	1.50	1.10	1.125	1.50	1.375	1.25
1924	1.25	1.50	1.35	1.125	1.75	1.25	1.25
1925	1.25	1.50	1.50	1.25	1.75	1.25	1.35
1926	1.35	1.645	1.56	1.25	1.75	1.25	1.375
1927	1.40	1.75	1.625	1.25	1.75	1.375	1.375
1928	1.42	1.75	1.625	1.45	1.75	1.375	1.4275
1929	1.50	1.84	1.65	1.50	1.75	1.375	1.50
1930	1.50	1.925	1.70	1.50	1.75	1.375	1.50
1931	1.50	1.7125	1.70	.8125	1.75	1.375	1.1875
1932	1.105	1.47	1.40	.825	1.50	1.175	.975
1933	1.10	1.575	1.403	.812	1.50	1.125	1.01
1934	1.12	1.53	1.50	1.00	1.50	1.50	1.30
1935	1.20	1.50	1.50	1.00	1.50	1.50	1.00
1936	1.28	1.50	1.50	1.00	1.50	1.50	1.00
1937	1.50	1.725	1.62	1.33	1.50	1.60	1.54
1938	1.50	1.886	1.70	1.50	1.50	1.75	1.60
1939	1.50	1.893	1.70	1.50	1.50	1.75	1.60
1940	1.50	1.96	1.70	1.49	1.50	1.75	1.60
1941	1.50	2.00	1.70	1.448	1.396	1.75	1.6375
1942	1.573	2.00	1.721	1.75	1.563	1.771	1.715
1943	1.625	2.00	1.75	1.75	1.75	1.802	1.764
1944	1.625	2.00	1.75	1.75	1.75	1.875	1.829
1945	1.625	2.00	1.84	1.75	1.84	1.875	1.845
1946	1.8825	2.25	1.9583	1.8906	1.975	2.0063	1.9371
1947	2.085	2.646	2.117	2.037	2.25	2.233	2.181

Common Building Laborers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.35	$0.375	$0.40	.....	$0.4875	$0.50	.....
1914-15	.35	.375	.40	.....	.4875	.50	.....
1916	.35	.375	.425	.....	.4875	.50	.....
1917	.40	.425	.45	.....	.4875	.50	.....
1918	.425	.47	.50	.....	.51	.625	.....
1919	.50	.575	.575	.....	.6375	.75	.....
1920	.70	.775	1.00	.....	.70	.93	.....
1921	.70	.875	1.00	.....	.85	1.00	$0.875
1922	.70	.875	.725	.....	.85	.71	.875
1923	.70	.95	.725	.....	1.00	.77	.93
1924	.82	1.00	.725	$0.385	1.20	.8125	.95
1925	.7625	1.00	.825	.6075	1.20	.8125	1.00
1926	.77	1.07	.88	.625	1.20	.8125	1.00
1927	.79	1.125	.925	.625	1.20	.875	1.00
1928	.805	1.125	.93125	.52	1.20	.875	1.00
1929	.85	1.15	.93	.50	1.20	.875	1.00
1930	.85	1.03125	.975	.50	1.20	.875	1.00
1931	.85	1.025	.975	.35	.87	.875	.70
1932	.70	1.00	.825	.40	1.00	.70	.80
1933	.70	.91	.....	.....	1.00	.70	.80
1934	.70	.825	.825	.....	.875	.70	1.00
1935	.70	.825	.825	.....	.875	.70	1.00
1936	.77	.825	.95	.30-.40	.875	1.00	1.00
1937	.85	1.14	1.025	.40	1.00	1.10	1.15
1938	.85	1.14	1.025	.40	1.00	1.25	1.15
1939	.85	1.14	1.025	.40	1.00	1.25	1.15
1940	.85	1.186	1.025	.40	1.00	1.25	1.15
1941	.85	1.214	1.025	.4583	1.00	1.25	1.15
1942	1.00	1.214	1.063	.65	1.075	1.25	1.285
1943	1.00	1.214	1.063	.65	1.15	1.40	1.33
1944	1.00	1.214	1.10	.65	1.15	1.40	1.395
1945	1.028	1.215	1.215	.641	1.056	1.072	1.172
1946	1.1667	1.2333	1.25	.65	1.00	1.1406	1.2371
1947	1.328	1.438	1.417	.775	1.288	1.325	1.470

Carpenters

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.50	$0.625	$0.65	$0.525	$0.625	$0.625	$0.56
1914-15	.55	.625	.65	.45	.625	.625	.56
1916	.57	.625	.70	.45	.625	.625	.56
1917	.60	.69	.70	.45	.65	.68	.65
1918	.65	.69	.70	.55	.70	.75	.825
1919	.75	.75	.80	.65	.825	.875	.93
1920	1.00	1.125	1.25	.75	1.00	1.06	1.00
1921	1.00	1.125	1.25	.75	1.25	1.125	.875
1922	1.00	1.125	1.10	.75	1.10	1.04	.875
1923	1.05	1.125	1.25	.75	1.25	1.04	1.00
1924	1.05	1.3125	1.17	.76	1.525	1.00	1.00
1925	1.0875	1.3125	1.3475	.6023	1.50	1.00	1.0825
1926	1.20	1.45	1.39	.6575	1.50	1.00	1.125
1927	1.25	1.50	1.30	.95	1.50	1.125	1.125
1928	1.279	1.50	1.50	1.00	1.50	1.125	1.125
1929	1.38	1.55	1.47	1.00	1.50	1.125	1.125
1930	1.375	1.65	1.625	1.00	1.50	1.125	1.125
1931	1.175	1.45	1.625	.60	1.50	1.125	.875
1932	1.04	1.33	1.40	.60	1.275	.96	.695
1933	1.055	1.375	1.3125	.60	1.25	.90	.73
1934	.9375	1.40	1.3125	1.00	1.25	1.05	.83
1935	.9275	1.40	1.3156	1.00	1.25	1.10	1.00
1936	.937	1.40	1.50	.88	1.25	1.12	1.00
1937	1.14	1.60	1.57	1.06	1.35	1.31	1.23
1938	1.343	1.75	1.625	1.125	1.25	1.25	1.25
1939	1.375	1.75	1.625	1.125	1.25	1.25	1.25
1940	1.375	1.81	1.625	1.125	1.333	1.25	1.25
1941	1.24	1.85	1.625	1.099	1.333	1.291	1.325
1942	1.417	1.85	1.656	1.167	1.50	1.385	1.415
1943	1.50	1.85	1.70	1.219	1.50	1.479	1.464
1944	1.50	1.85	1.70	1.25	1.50	1.50	1.544
1945	1.50	1.85	1.756	1.281	1.62	1.50	1.55
1946	1.625	2.10	1.9083	1.4479	1.8667	1.7083	1.6371
1947	1.838	2.467	2.067	1.573	2.044	1.883	1.881

Plasterers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.65	$0.69	$0.75	.....	$0.75	$0.875	$0.75
1914-15	.65	.69	.75	.....	.75	.875	.75
1916	.70	.75	.75	.....	.75	.875	.75
1917	.70	.75	.75	.....	.75	.875	.875
1918	.70	.75	.81	.....	.875	1.00	1.00
1919	.80	.90	.875	.....	1.00	1.125	1.125
1920	1.00	1.25	1.25	.....	1.25	1.25	1.25
1921	1.25	1.25	1.25	.....	1.375	1.375	1.25
1922	1.25	1.25	1.10	.....	1.375	1.375	1.125
1923	1.125	1.25	1.50	.....	1.50	1.375	1.25
1924	1.25	1.50	1.50	.....	1.75	1.375	1.375
1925	1.25	1.50	1.50	.....	1.75	1.50	1.375
1926	1.25	1.75	1.50	.....	1.75	1.50	1.375
1927	1.50	1.75	1.625	.....	1.75	1.50	1.375
1928	1.50	1.75	1.625	.....	1.75	1.50	1.50
1929	1.50	1.75	1.625	.....	1.75	1.375	1.50
1930	1.625	1.925	1.70	.....	1.75	1.375	1.50
1931	1.175	1.45	1.625	.60	1.50	1.125	.875
1932	1.04	1.33	1.40	.60	1.275	.96	.695
1933	1.055	1.375	1.3125	.60	1.25	.90	.73
1934	.9375	1.40	1.3125	1.00	1.25	1.05	.83
1935	.9275	1.40	1.3156	1.00	1.25	1.10	1.00
1936	.937	1.40	1.50	.88	1.25	1.12	1.00
1937	1.14	1.60	1.57	1.06	1.35	1.31	1.23
1938	1.343	1.75	1.625	1.125	1.25	1.25	1.25
1939	1.375	1.75	1.625	1.125	1.25	1.25	1.25
1940	1.375	1.81	1.625	1.125	1.333	1.25	1.25
1941	1.24	1.85	1.625	1.099	1.333	1.291	1.325
1942	1.417	1.85	1.656	1.167	1.50	1.385	1.415
1943	1.50	1.85	1.70	1.219	1.50	1.479	1.464
1944	1.50	1.85	1.70	1.25	1.50	1.50	1.544
1945	1.50	1.85	1.756	1.281	1.62	1.50	1.55
1946	1.625	2.10	1.9083	1.4479	1.8667	1.7083	1.6371
1947	1.838	2.467	2.067	1.573	2.044	1.883	1.881

Structural Ironworkers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.625	$0.625	$0.68	$0.625	$0.65	$0.75	$0.625
1914-15	.625	.625	.68	.625	.65	.75	.625
1916	.625	.66	.68	.625	.675	.75	.625
1917	.68	.68	.69	.625	.70	.75	.75
1918	.80	.80	.70	.75	.80	.875	.875
1919	.80	.875	.875	.80	.925	1.00	1.00
1920	1.00	1.125	1.25	1.00	1.25	1.125	1.125
1921	1.00	1.125	1.25	.....	1.25	1.25	1.125
1922	1.00	1.125	1.05	.....	1.06	1.125	1.00
1923	1.05	1.125	1.05	1.05	1.25	1.125	1.125
1924	1.16	1.29	1.25	1.00	1.45	1.125	1.125
1925	1.1375	1.4675	1.36	1.135	1.50	1.125	1.125
1926	1.23	1.60	1.405	1.25	1.50	1.125	1.125
1927	1.25	1.75	1.50	1.55	1.50	1.375	1.155
1928	1.3125	1.75	1.50	1.75	1.50	1.375	1.215
1929	1.375	1.81	1.57	1.63	1.57	1.375	1.25
1930	1.375	1.925	1.625	1.25	1.75	1.375	1.25
1931	1.375	1.925	1.625	.75	1.75	1.375	1.1875
1932	1.206	1.675	1.375	.75	1.50	1.13	1.13
1933	1.14	1.65	1.35	.75	1.47	1.20	1.10
1934	1.20	1.62	1.35	1.00	1.47	1.375	1.13
1935	1.20	1.65	1.35	1.125	1.47	1.375	1.23
1936	1.20	1.58	1.50	1.10	1.47	1.375	1.25
1937	1.375	1.79	1.58	1.25	1.73	1.44	1.39
1938	1.479	1.925	1.70	1.25	1.75	1.50	1.50
1939	1.60	1.925	1.70	1.25	1.75	1.50	1.50
1940	1.5625	1.9625	1.70	1.302	1.75	1.60	1.50
1941	1.50	2.00	1.70	1.469	1.75	1.60	1.5375
1942	1.588	2.00	1.725	1.50	1.75	1.625	1.615
1943	1.65	2.00	1.76	1.50	1.75	1.75	1.664
1944	1.65	2.00	1.76	1.50	1.75	1.75	1.729
1945	1.666	2.00	1.805	1.594	1.79	1.75	1.745
1946	1.7875	2.25	1.9033	1.625	1.9708	1.875	1.7954
1947	1.921	2.563	2.117	1.788	2.125	2.083	2.043

Common Laborers

	Boston	New York	Chicago	Birmingham	St. Louis	San Francisco	Seattle
1913	$0.35	$0.225	$0.40	.....	$0.25	$0.27	$0.375
1914-15	.35	.225	.40	.....	.25	.31	.375
1916	.35	.25	.425	.....	.25	.31	.375
1917	.375	.30	.45	.....	.30	.375	.4375
1918	.40	.405	.50	.....	.365	.43	.56
1919	.40	.405	.575	.....	.425	.625	.6875
1920	.6875	.75	1.00	.....	.6075	.75	.75
1921	.6875	.60	1.00	.....	.6075	.81	.75
1922	.6875	.60	.725	.....	.5575	.625	.625
1923	.6875	.615	.725	.....	.6075	.625	.625
1924	.6625	.6875	.8175	$0.335	.70	.525	.625
1925	.6025	.6525	.8175	.31	.6525	.525	.5625
1926	.615	.815	.86	.30	.6525	.525	.5675
1927	.595	.90625	.8875	.325	.5875	.55	.64
1928	.6025	.90625	.90	.325	.60	.55	.678
1929	.625	.985	.92	.29	.61	.57	.70
1930	.625	1.03125	.975	.275	.6375	.6875	.70
1931	.60	.65625	.7375	.20	.6125	.59375	.60
1932	.575	.645	.665	.225	.56	.56	.48
1933	.548	.725	.784	.248	.6223	.64	.48
1934	.55	.8475	.825	.30	.7875	.64	.53
1935	.575	.68	.825	.30	.7875	.625	.60
1936	.581	.65	.95	.35	.7875	.651	.60
1937	.725	.91	.99	.35	.86	.75	.87
1938	.735	.912	1.025	.35	.663	.65	1.00
1939	.725	.912	1.025	.35	.663	.65	.908
1940	.725	.912	1.025	.35	.804	.745	.90
1941	.7875	.934	1.025	.4167	.875	.842	.975
1942	.879	.991	1.056	.6375	.8875	.8875	1.058
1943	.90	.991	1.10	.65	.95	.95	1.082
1944	.95	1.0213	1.10	.65	.9625	.9875	1.118
1945	1.00	1.06	1.16	.65	1.00	1.00	1.145
1946	1.1667	1.2042	1.25	.65	1.00	1.1406	1.2433
1947	1.338	1.438	1.417	.875	1.325	1.325	1.363

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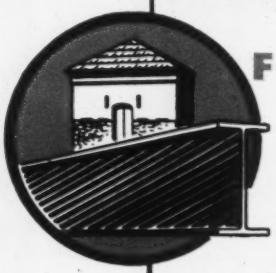

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Building Trades Wage Rates—8-Hour Day

(Prevailing March 1, 1948.—Compiled by Engineering News-Record)

City and State	Carpenters	Bricklayers	Structural Ironworkers	Common Labor Buildings	Common Labor Heavy Constr.	Stonemasons	Mason's Helpers	Plasterers	Mosaic and Terrazzo	Tile Layers	Cement Finishers	Lathers	Electric Workers (Inside)	Painters	Glaziers	Plumbers	Steamfitters	Roofers	Waterproofers	Sheet Metal Workers	Welders	Hoisting Eng.—1-Drum	Hoisting Eng.—2-Drum	Tractor Operator (Over 30-hp.)	Power Shovel Operator	Truck Drivers (Over 1½ Tons)
Anderson, Ind.	$1.88	$2.00		$1.20				$2.00			$2.00	$1.88	$1.75	$1.65		$1.75	$1.75	$1.50								$1.10
Atlanta, Ga.	1.65	2.25	$2.00	.75	$.85	$2.00	$.95	2.00	$2.00	$2.00	2.00	2.00	2.00	1.63	$1.40	2.00	2.00	1.50	$1.50	$1.65	$1.75	$1.50	$1.75	$2.00	$1.68	1.25
Austin, Tex.	1.88	2.50	2.00	.75	.75	2.50	.....	2.50	2.50	2.50	1.88	1.75	2.00	1.63	1.25	2.00	2.00	1.50	.....	2.00	2.25	1.75	2.00	2.00	2.00	1.00
Baltimore, Md.	1.95	2.50	2.15	1.10		2.50	1.20	2.00	2.00	2.00	1.90	2.00	2.00	1.78	1.75	2.00	2.00	1.93	1.93	2.00	2.00	[44] [1]1.90	[2]2.40	1.70	[2]2.40	1.25
Birmingham, Ala.	[4]1.75	2.25	1.90	.85	.95	2.25	[49].85	2.00	[49]1.75	1.75	1.88	1.88	2.00	1.75	1.63	2.25	2.25	[18]1.40	1.40	1.73	....	1.60	1.88	1.88	1.88	[49]1.25
Bismarck, N. D.	1.60	2.25	2.25	[5]1.15	[5]1.15	2.25	1.15	2.00	....	2.25	1.75	1.60	1.65	1.50	1.50	1.65	1.65	1.50	1.50	1.75	*	1.65	1.90	1.50	[4]1.90	1.25
Boston, Mass.	1.90	2.15	2.15	1.40	1.40	2.15	1.40	2.25	2.00	....	2.00	2.00	2.15	2.00	1.70	2.15	2.00	1.82	2.00	2.00	[52]2.15	2.25	2.25	1.88	2.25	1.25
Buffalo, N. Y.	2.00	2.25	2.15	1.40	1.40	2.25	....	2.15	1.98	1.98	1.98	2.15	2.15	1.88	1.90	2.15	2.15	[2]2.05	1.90	2.00	2.15	2.15	2.15	1.65	2.15	1.40
Burlington, Vt.	1.50	1.75	[33]1.25	1.10	1.10	1.75	1.15	1.75	1.75	1.75	1.75	....	1.75	1.50	[37]1.00	1.50	1.50	1.80	....	1.93	1.50	....	1.50	1.65	1.90	1.10
Charleston, S. C.	1.50	2.00	1.75	.60	.70	2.00	.75	2.00	1.25	1.25	1.75	1.75	1.75	1.88	1.88	1.75	1.75	1.00	1.00	1.50	1.75	1.25	1.50	1.15	1.15	.80
Charleston, W. Va.	....	2.25	2.00	1.13	1.13	2.25	1.28	1.88	2.05	2.05	1.75	1.88	2.00	1.75	1.68	2.00	2.00	1.50	1.50	1.80	2.00	2.00	2.00	1.65	2.00	1.23
Cheyenne, Wyo.	1.70	2.25	1.70	1.25	1.35	2.25	1.50	2.00	2.00	2.00	1.75	1.70	1.75	1.70	1.70	1.85	1.85	1.75	1.75	1.88	1.85	2.00	2.25	1.50	[12]2.25	1.15
Chicago, Ill.	2.15	2.20	2.20	1.50	1.50	2.20	1.50	2.23	2.15	2.15	2.15	2.23	2.15	2.15	2.25	2.15	2.15	2.20	2.20	2.15	2.20	2.15	[16]1.45	2.45	[17]1.30
Cincinnati, Ohio.	1.98	2.25	2.10	1.25	1.15	2.25	1.45	2.13	2.13	2.13	1.88	2.00	2.13	1.88	2.05	2.13	2.13	[2]1.90	1.75	1.90	....	2.00	2.00	[3]1.43	2.00	[4]1.50
Cleveland, Ohio.	[22]2.13	2.25	2.38	1.55	1.40	2.00	1.55	2.25	2.00	2.00	2.00	2.25	2.13	2.00	2.00	2.13	2.13	[2]2.25	....	2.00	....	2.00	2.00	....	2.25	1.40
Columbus, Ohio.	1.88	2.00	2.13	1.18	1.18	2.25	1.50	2.13	1.25	1.63	1.88	2.08	1.95	1.75	1.38	2.00	2.00	[18]1.50	1.50	1.88	2.13	1.75	1.75	1.43	2.00	1.25
Concord, N. H.	1.38	2.00	1.80	1.00	1.00	2.00	1.05	2.00	2.00	2.00	2.00	1.50	1.50	1.25	1.38	1.50	1.50	....	....	1.50	....	1.50	1.50	[15]1.25	1.90	1.05
Conway, Ark.	1.65	1.65	1.88	.65	.75	2.00	1.25	1.88	....	....	1.65	1.88	1.88	[20]1.25	....	1.88	1.88	1.50	....	....	1.50	....	....	....	....	....
Dallas, Tex.	1.88	2.25	2.00	.95	.95	2.25	1.10	2.13	2.13	2.13	1.88	2.13	2.00	1.88	1.63	2.13	2.13	1.63	1.88	2.00	2.13	1.75	2.00	2.00	2.00	[12]1.13
Denver, Colo.	1.88	2.25	1.88	1.28	1.35	2.15	1.43	2.25	2.15	2.15	2.00	2.25	2.05	1.75	[41]1.54	2.05	2.05	1.88	2.00	1.88	1.88	1.88	2.00	1.88	2.00	1.38
Des Moines, Iowa.	1.80	2.13	1.93	1.20	1.00	2.13	1.30	1.98	1.75	1.75	1.80	2.00	2.00	1.63	1.50	2.00	2.00	1.30	1.30	1.83	*	1.75	1.90	1.75	1.90	1.25
Detroit, Mich.	2.03	2.25	2.25	1.43	1.43	2.25	1.43	2.25	2.13	2.13	1.88	2.25	2.25	[34]1.95	1.75	2.25	2.17	2.13	1.88	....	*	2.25	2.25	2.00	2.00	1.45
Duluth, Minn.	1.65	1.90	1.90	[1]1.25	[1]1.25	1.90	1.25	1.90	1.75	[1]1.75	1.53	1.90	1.88	1.55	1.35	1.75	1.75	1.40	1.40	1.75	*	1.85	1.85	[1]1.75	2.00	1.10
Fort Worth, Tex.	1.88	2.25	1.75	.90	1.00	2.25	1.25	2.25	1.88	2.25	2.00	2.25	2.00	1.88	2.00	2.25	2.25	1.88	1.88	2.00	1.75	1.75	2.00	1.75	2.00	[4]1.50
Harrisburg, Pa.	1.58	2.00	2.25	1.00	1.00	2.00	1.25	1.88	1.88	1.88	1.88	1.88	1.75	1.40	1.44	2.00	2.00	1.38	1.38	1.75	2.00	2.13	2.13	1.75	2.25	1.26
Houston, Tex.	2.00	2.25	2.13	1.08	1.08	2.25	1.23	2.50	2.00	2.00	2.00	2.25	2.13	1.88	1.88	2.38	2.38	1.88	1.88	2.13	....	1.88	2.13	1.88	2.13	1.43
Indianapolis, Ind.	1.98	2.23	2.13	1.18	1.05	2.23	1.40	2.15	1.80	2.00	1.75	1.95	2.10	2.00	1.88	2.10	2.10	1.55	1.75	1.96	[2]2.13	2.10	2.10	2.10	[48]1.23
Jackson, Miss.	1.75	2.00	2.00	1.05	1.55	2.00	[46].90	2.00	2.00	2.00	2.00	1.75	1.90	1.50	1.50	2.00	2.00	1.50	1.50	1.60	2.00	2.00	2.00	2.00	2.00	1.00
Jacksonville, Fla.	[4]1.65	2.00	[7]1.88	[48].80	[46].90	2.00	[48].85	....	2.00	2.00	[49]1.50	2.00	[2]2.00	1.50	[4]1.75	2.35	[2]2.35	[20]1.50	[20]1.50	[4]1.55	[4]2.00	[2]2.00	[2]2.00	1.68	1.88	[55].90
Jefferson City, Mo.	1.63	2.25	2.25	1.00	1.00	2.25	1.75	....	....	....	2.00	....	2.50	1.63	1.63	1.75	1.75	1.75	2.00	1.75	1.15	1.65	2.20	2.20	2.20	1.10
Kansas City, Mo.	1.90	2.25	2.05	1.33	1.33	2.00	....	2.25	2.00	2.00	1.90	1.95	2.15	1.83	2.00	2.13	2.13	1.75	1.75	2.03	....	1.90	2.13	1.90	2.13	[4]1.35
Little Rock, Ark.	2.50	2.75	2.00	.80	.90	2.00	1.38	2.25	1.88	2.50	2.50	2.25	2.00	1.88	1.88	2.50	2.50	2.00	1.75	1.75	1.88	1.58	1.75	1.50	2.00	1.10
Los Angeles, Calif.	1.90	2.38	2.10	1.35	1.35	2.38	1.63	[30]2.50	2.15	2.50	1.98	[32]2.25	2.25	[34]1.85	1.84	2.25	2.25	2.00	2.00	1.94	*	1.85	1.85	1.90	2.10	1.54
Meridian, Miss.	1.50	2.00	2.25	1.05	1.55	2.00	.80	2.00	2.00	2.00	2.00	1.50	1.85	1.50	1.50	2.00	2.00	1.50	1.50	1.60	2.00	2.00	2.00	2.00	2.00	1.00
Milwaukee, Wis.	1.80	2.00	1.85	1.35	1.40	2.00	1.45	2.00	1.95	1.90	1.85	2.00	2.00	1.65	1.85	2.00	2.00	1.70	1.70	[32]2.00	1.85	1.85	1.85	1.80	2.15	1.35
Minneapolis, Minn.	1.80	2.08	2.00	1.30	1.30	2.08	1.40	2.25	1.90	1.90	1.88	2.25	2.06	1.80	1.70	2.00	2.00	1.73	1.73	1.90	*	1.85	1.85	[7]1.88	2.00	[13]1.45
New Orleans, La.	1.70	2.05	2.00	.90	.90	2.00	1.00 [23].41	1.88	....	....	1.63	2.00	2.00	[43]1.63	1.63	2.05 [42].28	2.05	1.58	1.58	1.75	2.05	[18]1.63	1.88	1.88	1.88	.85
New York, N. Y.	[22]2.75	[22]2.75 [55]	3.00	[40]1.50	[40]1.50	[22]2.75	1.78	[28]3.00	[12]2.60	2.50	[22]2.75	[22]2.75	[28]2.50	[22]2.30	[22]2.75	2.50	[22]2.75	[22]2.75	[22]2.50	[22]2.75	*	2.50	2.75	2.38	3.13	1.64
Norfolk, Va.	1.68	2.75	2.00	.75	.75	2.00	.85	2.25	2.00	2.00	1.50	2.13	2.00	1.50	1.50	2.00	2.00	[18]1.75	[21]1.50	1.75	*	1.63	1.88	1.88	1.88	1.00
Oklahoma City, Okla.	1.88	[22]2.25	2.12	1.15	1.00	[22]2.00	[23]1.40	2.75	2.25	2.00	[22]2.50	2.75	2.25	2.00	2.00	[22]2.50	[22]2.50	1.75	1.75	2.00	1.60	1.75	2.00	2.00	2.00	1.33
Omaha, Nebr.	1.83	2.10	1.93	1.13	1.13	2.10	1.13	2.00	1.85	1.75	1.83	2.00	2.00	1.50	1.50	2.00	2.00	[4]1.70	[4]1.70	1.75	1.93	1.75	2.00	2.00	2.00	1.13
Philadelphia, Pa.	2.00	[22]2.50	2.40	1.10	1.10	2.13	1.63	2.50	2.13	2.00	2.00	2.25	2.38	[24]1.90	[25]1.93	2.25	2.25	[4]1.90	[42]2.30	2.25	*	2.25	2.25	2.50	2.50	[26]1.25
Pierre, S. D.	[4]1.50	[4]2.25	....	.75	1.00	....	....	[4]1.50	....	....	[4]1.50	....	[4]1.50	[4]1.50	....	[4]1.75	....	....	....	[4]1.50	....	....	....	[4]2.50	1.50	1.00
Pittsburgh, Pa.	2.25	2.45	2.25	1.30	1.30	2.25	.....	2.25	2.25	2.00	2.25	2.25	2.25	2.00	2.00	2.25	2.25	2.00	2.00	2.25	.....	2.40	2.40	....	2.40	[18]1.28
Portland, Ore.	1.93	2.50	2.13	1.53	1.35 [45]	.....	.....	2.35	.....	.....	1.83	2.25	2.00	1.88	1.84	2.25	2.25	1.80	1.80	1.95	.....	1.80	2.05	[4]1.95	[42]2.10	1.53
Richmond, Va.	1.65	2.25	2.25	.90	1.25 [45]	2.25	1.00	2.25	1.63	1.63	1.63	1.88	2.00	1.63	1.50	2.00	2.00	1.88	1.63	1.88	*.	1.63	1.88	1.88	1.88	.93
St. Louis, Mo.	2.20	2.50	2.25	1.35	1.75	2.25	[42]1.65	2.25	2.00	2.00	2.15	2.38	2.25	2.07	2.04	2.25	2.25	2.00	[42]2.00	2.25	2.25	1.85	2.40	[42]2.40	2.40	1.40
St. Paul, Minn.	1.80	2.08	2.00	1.30	1.30	2.08	1.40	2.05	1.90	1.90	1.83	2.05	2.06	1.75	1.70	2.00	2.00	1.73	1.73	1.90	*	1.85	1.85	[7]1.88	2.00 [53] [53]	[13]1.45
St. Petersburg, Fla.	1.63	2.00	1.75	.85	1.00	2.00	.85	2.00	2.00	2.00	1.75	1.63	2.00	1.50 [49]	1.50	2.00	2.00	1.35	2.00	2.00	2.00	1.75	1.75	1.75	1.88	[41]1.00
Salt Lake City, Utah	1.63	2.00	2.00	1.13	1.13	2.00	1.50	2.00	1.80	1.80	1.63	2.00	2.00	2.00	1.56	1.88	1.88	1.75	1.75	1.88	*	1.63	[49]1.63	1.75	1.90	1.25
San Antonio, Tex.	1.75	2.25	2.00	.90	1.43	2.25	1.17	2.25	2.00	2.00	1.85	2.25	2.00	1.75	1.75	2.13	2.13	1.38	*	2.00	[42]2.00	[45]1.50	[45]1.75	1.50	1.50	[47].75
San Francisco, Calif.	2.00	2.81	2.25	1.40	1.40	2.81	[28]1.75	[28]2.25	2.00	2.38	2.03	[28]2.50	2.25	[22]2.00	1.88	2.25	2.25	2.00	2.00	2.00	*	2.00	2.00	2.10	[42]2.50	[21]1.50
Seattle, Wash.	2.07	2.37	2.27	1.67	1.70	2.37	1.92	2.37	2.12	2.12	2.07	2.27	2.27	2.07	2.02	2.34	2.34	2.07	2.07	2.22	2.15	2.20	2.20	2.15	2.50	[2]2.25
Springfield, Ill.	2.13	2.00	2.00	1.45	1.40	2.00	1.55	2.50	2.00	....	2.00	2.25	2.00	2.00	2.00	2.15	2.15	1.85	....	1.90	....	1.75	2.15	1.75	2.15	1.40
Tacoma, Wash.	2.06	2.50	2.26	1.68	1.68	2.50	2.05	2.55	2.25	2.25	2.18	2.45	2.26	2.06	....	2.34	2.34	2.06	2.06	2.21	....	2.20	2.20	[3]1.95	[42]2.80	[11]1.80
Toledo, Ohio.	2.00	2.25	2.25	1.48	.....	2.25	1.55	2.25	2.00	2.00	2.22	2.25	2.25	[24]1.88	1.65	2.19	2.19	1.98	2.25	1.98	*	*	*	....	2.25	1.30
Topeka, Kan.	1.50	2.00	2.05	.98	.98	2.00	1.03	2.25	2.25	2.00	1.97	1.63	1.75	[29]1.50	1.50	1.88	1.88	1.50	*	1.75	*	1.50	1.75	1.50	1.75	1.08
Trenton, N. J.	2.25	2.40	[42]2.50	1.40	....	2.40	1.40	2.40	2.40	2.40	2.40	2.25	[42]2.25	[12]2.25	2.25	2.25	2.25	2.00	[42]2.00	2.25	.....	.....	.....	.....	.....	.....
Wilmington, Del.	2.05	2.50	2.40	1.18	1.43	2.25	.....	2.25	2.05	2.05	1.88	2.00	2.25	1.75	1.93	2.15	2.15	[1]1.90	.....	.....	.....	2.25	2.25	1.88	2.50	1.25

NOTE: Hourly rates are rounded to closest cent where fractional parts of cent are quoted. * Same as craft doing work. [1] Caterpillar type. [2] Slate and tile. [3] Bulldozers, power-grading, $1.75. [4] Hard; soft, $1.55. [5] Over 50-hp. [6] Composition, slate and tile, $2.30. [7] Over 50-hp. with or without power takeoff. [8] Inside. [9] Caterpillar type without attachments. Bulldozer, $2.15. [10] 120-B type and over. [11] Dump truck, 5 yds. [12] ¾ yd. and smaller. [13] 6 to 8 cu. yds. [14] 1 to 5 cu. yds. [15] Chauffeurs and teamsters union. [16] 5 to 7 tons. [17] Less than 2 tons. [18] Composition. [19] Transit-mix. [20] Plus 15% for equipment. [21] Cement. Membrane, $1.75. [22] Plus 5¢ per hr. for tool replacement. [23] 7-hr. day. [24] Brush. Spray, $2.03. [25] Site. Shop, $1.48. [26] Euclid truck, $1.50. [27] With dozier blades, $1.50. [28] 6-hr. day. [29] Brush. Spray, $2.25. [30] Power takeoff. Caterpillars, $1.85. [31] 7 to 8 hr. day. [32] Manhattan and Bronx. [33] Non-union. [34] Brush. [35] Ironworkers and electrical union. [36] $2.25 for 6 hr. day. [37] Non-union, $1.25. [38] Escalator clause with cost of living index. [39] Less than 4 stories. [40] Excavating. [41] Hodcarriers. [42] Sept 1, 1947 rate was $1.35. [43] Dampproofers. [44] Under asbestos workers. [45] Light. [46] Heavy. [47] Minimum, no local union. [48] Transport truck drivers, $1.55. [49] Unchanged since Sept. 1, 1947. [50] Sept. 1, 1947 rate was $1.375. [51] Night work, $1.825. [52] 1½–3 tons.

WAGE RATE RANGES. [a] $1.75 to $1.90. [b] $2.20 to $2.40. [c] $1.58 to $1.70. [d] $1.30 to $1.50. [e] $1.15 to $1.35. [f] $1.15 to $1.25. [g] $1.25 to $1.50. [h] $1.75 to $2.25. [i] $1.50 to $1.75. [j] $1.80 to $2.25. [k] $1.90 to $2.30. [l] $.70 to $.80. [m] $.80 to $.90. [n] $1.05 to $1.15. [o] $1.65 to $1.90. [p] $2.10 to $2.13. [q] $1.50 to $1.65. [r] $1.50 to $1.88. [s] $.75 to $.80. [t] $.75 to $.85. [u] $1.50 to $2.00. [v] $1.32 to $1.50. [w] $1.65 to $1.75. [x] $1.50 to $2.35. [y] $1.38 to $1.55. [z] $1.38 to $1.68. [aa] $1.70 to $1.88. [bb] $.75 to $.90. [cc] $1.63 to $1.75. [dd] $1.63 to $1.88. [ee] $2.40 to $2.50. [ff] $1.43 to $1.50. [gg] $1.63 to $2.00. [hh] $1.35 to $1.75. [ii] $1.50 to $1.70. [jj] $1.90 to $2.25. [kk] $.90 to $1.25. [ll] $.85 to $1.00. [mm] $1.75 to $1.88. [nn] $2.50 to $2.75.

Eichleay installed 44,500 tons of penstock pipe at Boulder Dam, world's highest. Some sections were 22' long, 30' in diameter and weighed 186 tons each.

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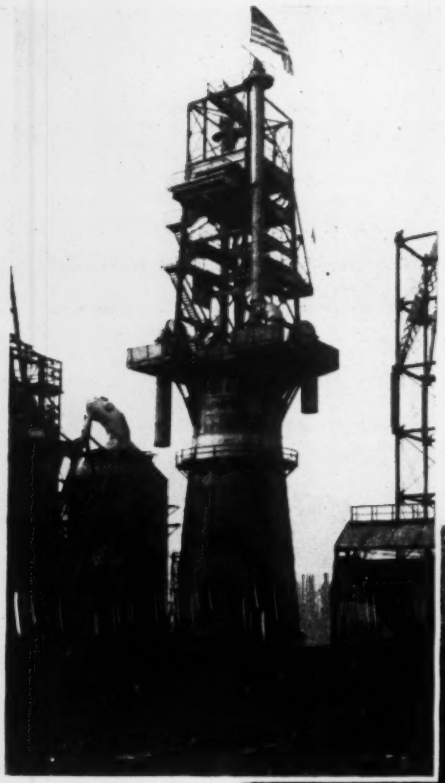
12,500 ton Bell Telephone Co. building, Indianapolis, Ind. moved 52 ft. and pivoted 90 degrees. While the moving was going on all normal business operations, elevators, switchboards, etc. were uninterrupted.

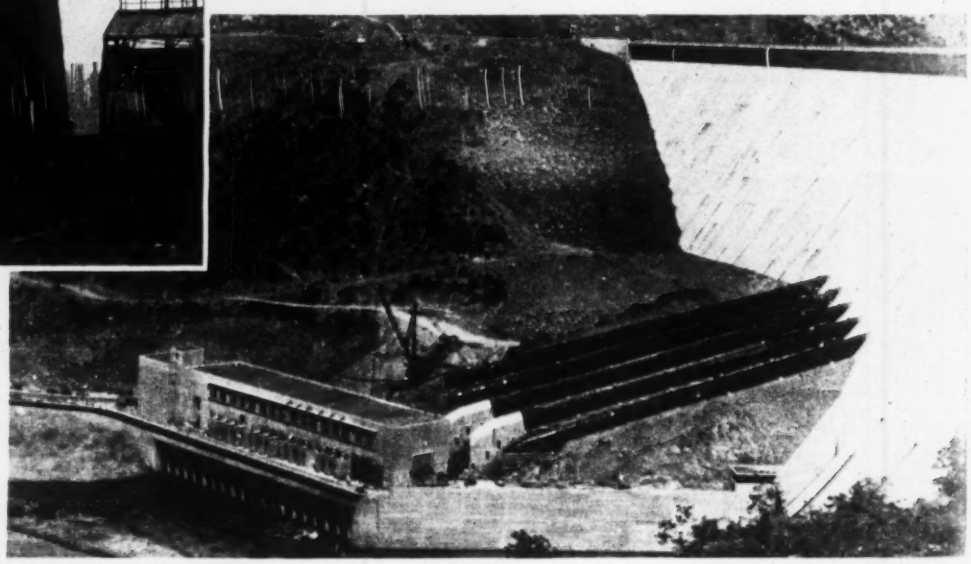


Eichleay service is based on sound engineering principles plus years of experience in highly specialized fields. All projects are carefully analyzed and handled with maximum economy in time, materials and money. Inquiries invited.

EICHLEAY

33 SOUTH 19th STREET PITTSBURGH 3, PA.

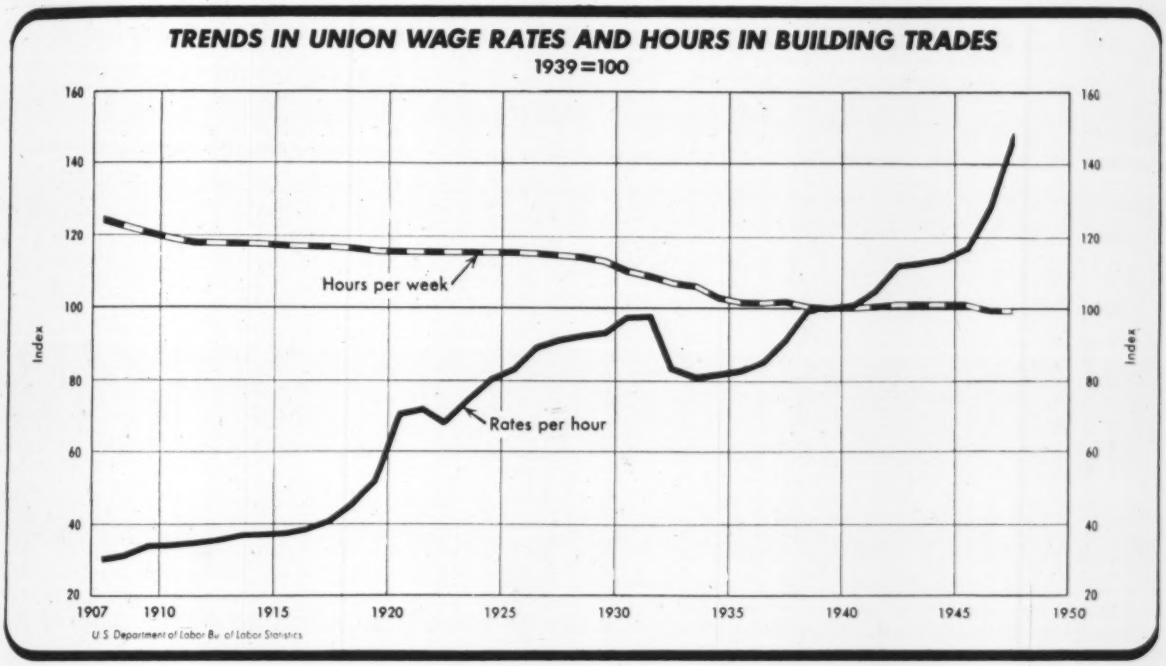
Eichleay recently undertook the completion of the installation of Penstocks at Shasta Dam, second largest dam in the world. Progress is shown in photo.

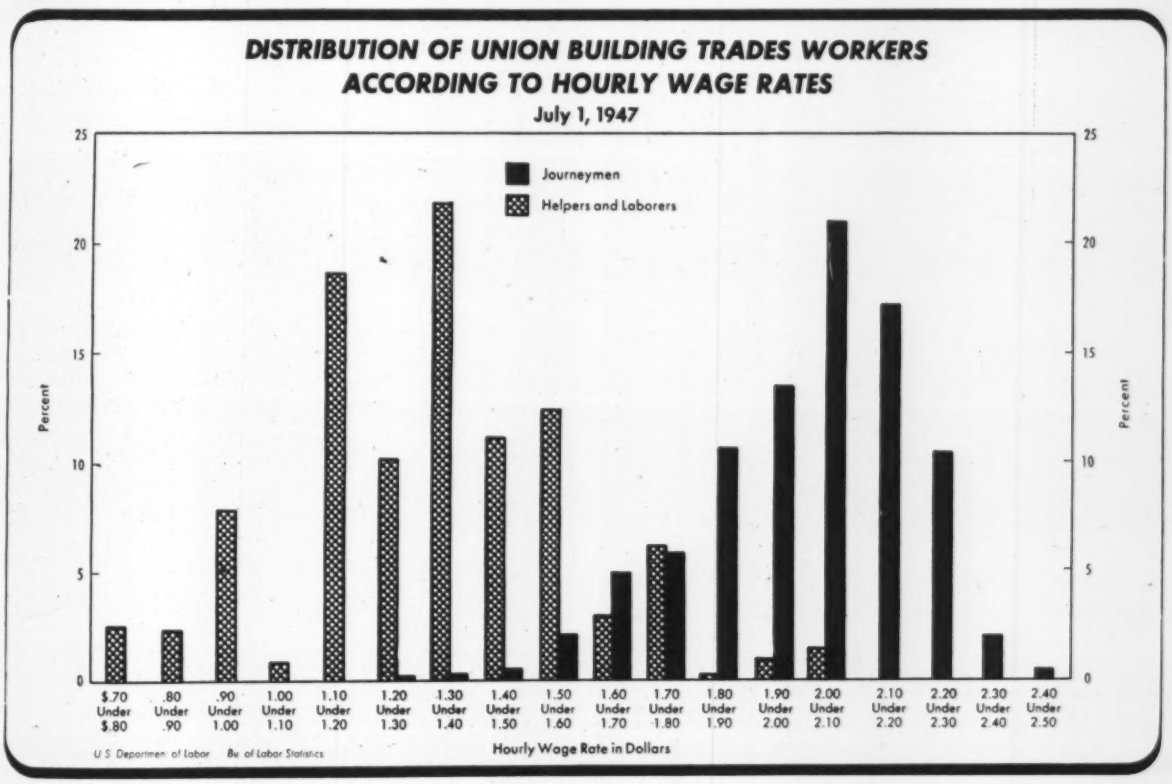


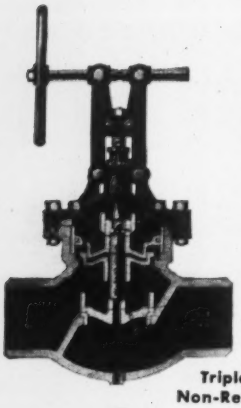
While a new Blast Furnace was being erected, the old furnace continued to produce pig iron. It was then dismantled and the new furnace was moved 112 ft. onto the old foundation.

Labor Department Analysis of Union Building Wages

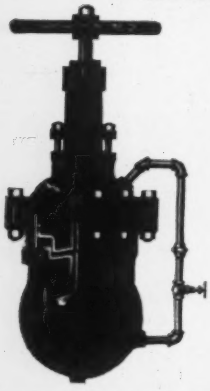
Hourly wage rates for organized building-trades journeymen averaged $2.04 on July 1, 1947, an increase of 14 percent over the July 1, 1946 rate of $1.792, in the 75 cities surveyed by the Bureau of Labor Statistics, U. S. Department of Labor, and reported in the January 1948 Monthly Labor Review. Helpers and laborers



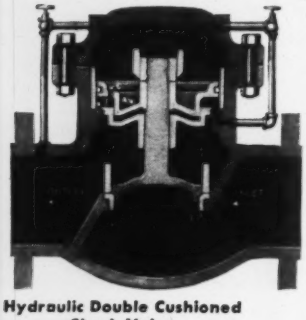




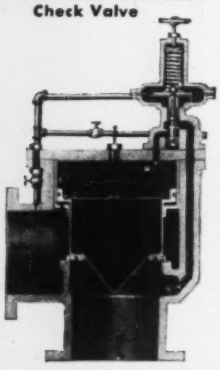
Triple Acting
Non-Return Valve



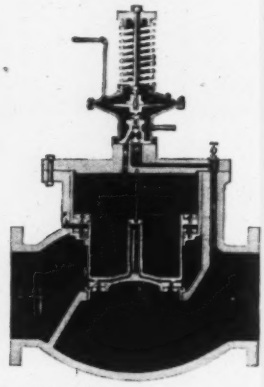
Throttle and Automatic Engine
Stop Valve



Hydraulic Double Cushioned
Check Valve



Water Pressure
Relief Valve



Stop Check Single Acting
Altitude Valve

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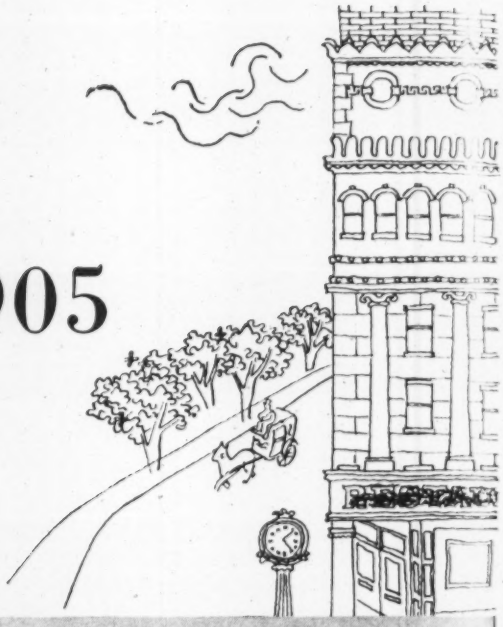

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averaged $1.31 per hour, a 15 percent rise over the July 1, 1946 rate of $1.138. Straight-time weekly hours averaged 39.1 for journeymen, 39.6 for helpers and laborers.

A majority of journeymen had hourly rates ranging from $1.90 to $2.20, while a similar proportion of helpers and laborers were paid between $1.20 and $1.60. Among journeymen, bricklayers recorded the highest average rate, $2.37, and composition roofers the lowest, $1.89.

A comparable survey made on July 1, 1946 shows the majority of journeymen receiving hourly wages ranging from $1.60 to $1.90 and helpers and laborers, hourly wages ranging from $1.00 to $1.40.

Union wage scales have been the subject of annual studies made by the Bureau of Labor Statistics since 1907. The original studies included 39 cities; the scope has been gradually increased so that the current report covers 75 cities ranging in size from 40,000 to over 1,000,000. For many years data were collected as of May 15. The survey date was advanced to June 1 in 1939 and then to July 1 in 1942. The latest change was made to coincide with the effective date of the national agreement stabilizing construction wages.

Average Hourly Wage Rates and Straight-Time Weekly Hours

Trade	Average Rate per Hour	Hours per Week
All building trades	**$1.91**	**39.2**
Journeymen	2.04	39.1
Asbestos workers	1.99	39.4
Boilermakers	2.09	39.3
Bricklayers	2.37	38.4
Carpenters	2.00	39.3
Cement finishers	1.97	39.5
Electricians, inside wiremen	2.11	38.4
Elevator constructors	2.09	40.0
Glaziers	1.90	40.0
Lathers	2.24	38.8
Machinists	2.08	40.0
Marble setters	2.07	40.0
Mosaic and terrazzo workers	2.10	38.6
Painters	1.90	38.9
Paperhangers	1.92	39.9
Plasterers	2.27	37.6
Plumbers and gas fitters	2.20	37.9
Rodmen	1.96	39.8
Roofers, composition	1.89	39.9
Roofers, slate and tile	1.92	40.0
Sheet-metal workers	1.99	39.3
Steam and sprinkler fitters	2.11	39.5
Stonemasons	2.24	38.7
Structural-iron workers	2.12	39.9
Tile layers	2.12	40.0
Helpers and laborers	1.31	39.6
Bricklayers' tenders	1.45	38.7
Building laborers	1.23	39.8
Composition roofers' helpers	1.10	39.7
Elevator constructors' helpers	1.47	40.0
Marble setters' helpers	1.34	39.9
Plasterers' laborers	1.58	38.1
Plumbers' laborers	1.34	40.0
Terrazzo workers' helpers	1.63	40.0
Tile layers' helpers	1.54	40.0

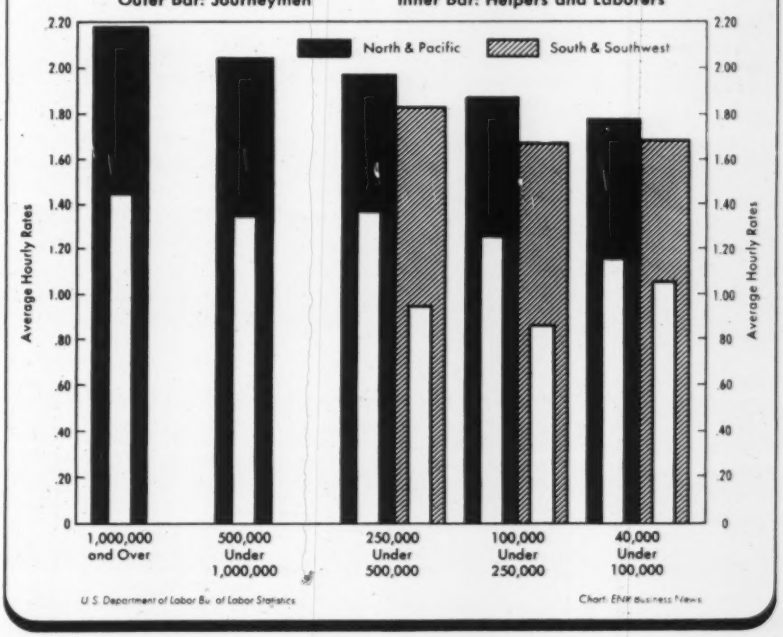
Average Union Hourly Wage Rates in the Building Trades, by Cities and Population Groups, July 1, 1947

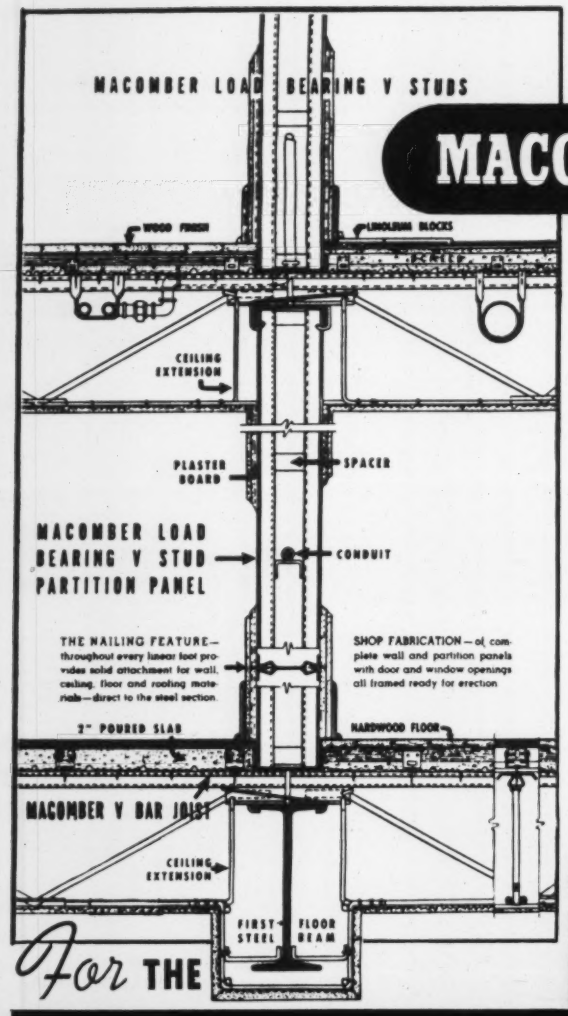
Population Groups — Cities in Each Population Group	Average Hourly Rate — Journeymen	Helpers and Laborers
I (over 1,000,000)		
New York, N. Y.	$2.431	$1.715
Average for Group I	**2.189**	**1.455**
Chicago, Ill.	2.158	1.512
Philadelphia, Pa.	2.086	1.129
Detroit, Mich.	2.051	1.477
Los Angeles, Calif.	1.967	1.442
II (500,000 to 1,000,000)		
St. Louis, Mo.	2.133	1.417
Cleveland, Ohio	2.109	1.509
Washington, D. C.	2.109	1.215
Pittsburgh, Pa.	2.099	1.187
Buffalo, N. Y.	2.061	1.427
San Francisco, Calif.	2.050	1.470
Average for Group II	**2.049**	**1.354**
Boston, Mass.	1.971	1.400
Baltimore, Md.	1.970	1.135
Milwaukee, Wis.	1.833	1.403
III (250,000 to 500,000)		
Newark, N. J.	2.383	1.692
Toledo, Ohio	2.081	1.465
Seattle, Wash.	2.036	1.554
Indianapolis, Ind.	1.992	1.261
Cincinnati, Ohio	1.991	1.293
Rochester, N. Y.	1.970	1.290
Columbus, Ohio	1.954	1.214
Kansas City, Mo.	1.950	1.364
Dallas, Texas	1.941	1.016
Houston, Texas	1.937	.991
Denver, Colo.	1.925	1.366
Average for Group III	**1.924**	**1.217**
Minneapolis, Minn.	1.883	1.369
St. Paul, Minn.	1.867	1.329
Portland, Ore.	1.829	1.362
Louisville, Ky.	1.812	1.134
Providence, R. I.	1.785	1.208
Memphis, Tenn.	1.756	.880
Atlanta, Ga.	1.751	.796
Birmingham, Ala.	1.751	.871
San Antonio, Texas	1.751	.882
New Orleans, La.	1.718	.913
IV (100,000 to 250,000)		
Dayton, Ohio	$2.033	$1.283
Peoria, Ill.	1.996	1.381
New Haven, Conn.	1.976	1.362
Spokane, Wash.	1.968	1.420
Youngstown, Ohio	1.942	1.238
South Bend, Ind.	1.911	1.352
Rock Island (Ill.) district*	1.907	1.304
Oklahoma City, Okla.	1.871	1.025
Reading, Pa.	1.855	1.153
Grand Rapids, Mich.	1.854	1.255
Springfield, Mass.	1.852	1.203
Scranton, Pa.	1.847	1.159
Omaha, Nebr.	1.841	1.159
Des Moines, Iowa	1.821	1.214
Erie, Pa.	1.821	1.183
Average for Group IV	**1.812**	**1.161**
Richmond, Va.	1.765	1.240
Worcester, Mass.	1.758	1.135
Duluth, Minn.	1.705	1.198
Wichita, Kans.	1.701	1.056
Salt Lake City, Utah	1.689	1.260
Nashville, Tenn.	1.678	.763
Jacksonville, Fla.	1.652	.768
Norfolk, Va.	1.629	.865
Tampa, Fla.	1.569	.789
Charlotte, N. C.	1.566	.782
V (40,000 to 100,000)		
Butte, Mont.	1.980	1.336
Charleston, W. Va.	1.937	1.165
Binghamton, N. Y.	1.807	
Phoenix, Ariz.	1.807	1.220
Madison, Wis.	1.755	1.321
El Paso, Texas	1.737	
Average for Group V	**1.730**	**1.096**
Mobile, Ala.	1.724	.909
Charleston, S. C.	1.649	.789
Little Rock, Ark.	1.638	.819
Manchester, N. H.	1.603	1.075
Jackson, Miss.	1.586	.741
York, Pa.	1.580	1.011
Portland, Maine	1.529	1.026

*Includes Rock Island and Moline, Ill., and Davenport, Iowa.

AVERAGE UNION WAGE RATES IN BUILDING TRADES ACCORDING TO SIZE OF CITY AND REGION

July 1, 1947




MACOMBER LOAD BEARING V STUDS
WOOD FINISH
LINOLEUM BLOCKS
CEILING EXTENSION
PLASTER BOARD
SPACER
MACOMBER LOAD BEARING V STUD PARTITION PANEL
CONDUIT
THE NAILING FEATURE—throughout every linear foot provides solid attachment for wall, ceiling, floor and roofing materials—direct to the steel section.
SHOP FABRICATION—of complete wall and partition panels with door and window openings all framed ready for erection.
2" POURED SLAB
HARDWOOD FLOOR
MACOMBER V BAR JOIST
CEILING EXTENSION
FIRST FLOOR STEEL BEAM

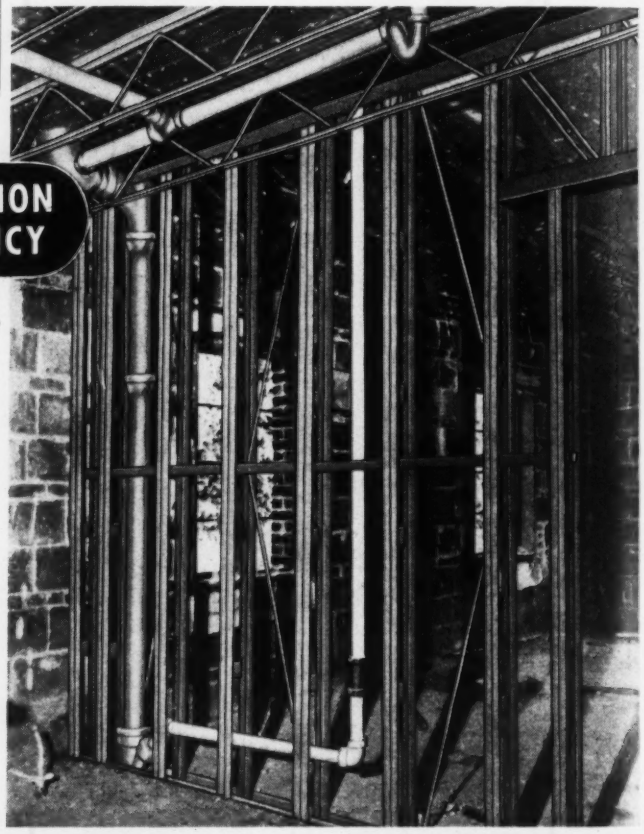
Have You Investigated

MACOMBER STEEL FRAMING

Shown opposite is a cross section of the Load Bearing Partition illustrated below. These units are made in panels for easy handling. All service lines are hidden within the panel and plaster base is nailed to steel stud sections.

These steel framing units are now being fabricated for multi-story apartments in many localities. They are used to speed up framing time. When used in conjunction with V Bar Joists and a poured slab with plastered ceiling below, they reduce insurance rates considerably. Light weight Roof Trusses complete the steel framing.

For single dwellings of the same design, outside wall panels framing all openings are fabricated from Macomber V Sections. With the exception of V Joists, these steel framing units are applicable primarily to multiple building units of the same design.



For THE

FAST ECONOMICAL CONSTRUCTION OF MULTIPLE LIGHT OCCUPANCY

Buildings

MACOMBER

V BAR STEEL FLOOR JOISTS

JIG WELDED WALL PANELS

LOAD BEARING PARTITIONS

LIGHT WEIGHT ROOF TRUSSES

Write us for further information.

MACOMBER INCORPORATED CANTON, OHIO

Index of Union Hourly Wage Rates in Each Building Trade (1939 = 100)

U. S. Bureau of Labor Statistics, Wage Analysis Branch

Year	All Building Trades	Journeymen	Helpers & Laborers	Bricklayers	Carpenters	Cement Finishers	Electricians (Inside Wiring)	Glaziers	Lathers	Painters	Plasterers	Plumbers & Gas Fitters	Sheet Metal Workers	Steam & Sprinkler Fitters	Stonemasons	Structural Ironworkers	Building Laborers	Hod Carriers
1907	29.3	29.7	27.3	37.7	29.8	34.5	27.9	.....	.....	26.2	37.3	33.3	30.6	30.1	33.9	27.9	30.8	30.3
1908	31.2	31.6	28.5	38.7	31.7	34.4	30.5	.....	.....	29.0	37.2	33.7	31.3	30.5	34.4	30.4	31.0	30.3
1909	32.7	33.2	29.5	39.5	33.5	35.5	31.5	.....	.....	31.0	37.5	34.2	31.4	34.7	34.5	32.6	31.1	30.4
1910	34.0	34.6	30.5	40.2	35.0	35.8	32.4	.....	.....	33.0	37.9	34.5	32.3	32.2	34.8	34.7	32.3	30.9
1911	34.5	35.2	30.6	40.2	35.5	37.2	32.8	.....	.....	33.6	38.1	36.5	33.5	33.2	35.2	35.5	32.4	31.2
1912	35.3	36.0	30.9	40.8	36.3	37.2	33.1	.....	33.8	34.0	38.9	36.7	34.1	33.8	35.5	36.1	32.7	31.4
1913	36.1	36.9	31.8	41.5	36.8	38.0	33.8	.....	34.6	35.5	39.3	37.9	35.6	35.0	36.7	37.3	34.2	31.8
1914	36.9	37.7	32.1	42.5	37.4	38.4	34.9	.....	35.2	36.7	39.4	38.4	36.9	35.7	37.8	38.0	34.5	32.2
1915	37.2	38.0	32.4	42.6	37.8	38.8	35.6	.....	35.7	36.9	39.6	38.7	37.4	36.5	38.2	38.0	34.7	32.4
1916	38.4	39.3	33.5	43.0	39.0	39.1	36.3	.....	36.7	40.3	41.0	39.0	38.0	37.2	38.8	38.6	36.3	33.4
1917	40.8	41.5	36.8	44.5	42.4	41.4	38.7	.....	38.1	41.5	42.2	40.4	39.7	38.6	40.2	40.9	40.1	37.2
1918	45.3	45.9	42.6	47.8	47.1	45.7	43.0	40.6	41.2	45.8	44.5	44.6	46.5	42.2	44.1	46.8	37.0	43.4
1919	51.9	52.4	49.3	53.0	54.2	41.2	49.3	43.4	45.8	53.6	51.3	50.4	51.3	47.4	49.5	52.7	53.3	50.8
1920	70.0	70.1	71.5	72.4	72.5	69.6	65.0	62.8	65.3	74.0	67.0	65.2	68.8	62.6	69.0	66.8	77.2	73.9
1921	71.3	71.4	72.2	71.9	73.1	71.9	67.3	63.9	66.3	75.1	70.7	68.2	71.3	63.4	70.0	68.1	77.6	74.2
1922	66.9	67.3	65.7	70.0	67.7	66.7	63.5	64.0	62.3	70.3	67.9	63.4	66.1	61.9	65.8	61.8	72.9	61.5
1923	73.9	74.2	69.7	79.2	75.5	73.0	65.9	67.9	68.8	77.1	75.7	70.0	71.2	65.0	77.8	65.9	74.3	67.2
1924	79.8	80.1	75.4	83.8	80.8	80.7	73.6	71.6	74.2	81.2	84.7	76.3	78.2	74.5	82.5	74.6	82.7	70.2
1925	82.9	83.1	77.9	88.7	82.5	81.1	77.4	79.6	80.9	85.7	86.1	77.9	80.8	78.4	84.1	75.4	79.0	78.4
1926	88.3	88.7	84.9	94.1	88.5	86.6	81.5	80.7	83.0	90.9	92.4	83.9	86.3	84.9	92.7	81.1	86.9	85.5
1927	91.3	91.7	86.4	96.4	91.4	90.4	84.9	86.2	86.3	93.9	94.4	85.6	88.9	87.3	93.9	86.8	87.2	87.5
1928	91.9	92.4	87.3	97.2	91.7	89.5	85.7	87.2	86.6	95.4	94.6	87.4	87.2	88.6	95.0	87.0	87.6	87.6
1929	93.1	93.6	88.8	99.4	93.2	89.5	89.3	88.5	85.9	95.2	93.5	88.1	90.6	89.1	97.7	87.7	88.9	91.4
1930	97.0	97.5	93.3	101.8	96.9	95.4	90.0	92.6	89.6	100.6	98.1	91.5	94.7	93.5	99.1	92.5	92.9	94.9
1931	97.3	97.8	92.8	101.6	97.1	95.8	92.1	93.2	89.1	101.0	97.9	92.6	96.2	94.0	99.6	93.4	91.5	94.6
1932	83.1	83.6	79.2	87.0	79.6	83.6	87.9	78.0	80.0	85.3	81.4	80.5	83.4	81.0	88.4	81.0	78.7	78.4
1933	80.8	81.4	75.7	84.7	79.4	81.6	80.3	77.9	77.1	83.6	78.2	79.8	81.0	78.6	82.5	80.1	74.1	77.4
1934	81.4	81.8	77.9	85.0	80.8	82.4	80.4	82.5	79.1	82.3	79.1	80.5	81.3	79.5	82.4	81.1	76.9	82.5
1935	82.3	82.8	78.3	83.7	81.8	82.9	84.3	83.3	80.0	82.6	80.0	81.8	81.9	80.8	82.2	81.8	78.0	79.9
1936	85.3	85.5	82.9	84.2	86.0	85.0	86.5	84.5	82.0	86.8	80.5	83.9	83.5	83.5	83.2	83.9	84.7	84.2
1937	91.2	91.4	90.1	90.1	91.6	91.2	90.3	92.6	87.5	93.0	88.7	88.5	89.6	88.1	91.9	91.6	92.7	90.6
1938	99.3	99.3	99.2	99.5	99.8	99.6	99.5	99.3	96.8	99.2	99.2	99.1	98.6	99.3	99.7	98.9	99.4	99.7
1939	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1940	101.6	101.4	102.0	102.2	102.5	100.9	101.7	101.4	100.7	100.2	100.5	101.6	101.8	100.3	99.5	100.4	101.6	103.8
1941	105.3	105.0	106.8	104.6	104.8	104.5	106.3	104.3	104.5	106.9	102.2	106.0	106.5	103.4	102.1	105.2	107.6	107.3
1942	111.9	110.9	117.5	108.3	112.1	110.8	113.5	108.8	109.1	110.5	105.0	110.5	116.0	109.3	108.0	108.7	119.6	115.7
1943	112.7	111.5	118.9	108.7	112.5	112.0	113.8	109.6	109.2	112.4	105.2	110.9	116.4	109.9	108.4	109.1	121.3	116.4
1944	113.6	112.4	120.3	110.0	113.4	113.1	114.7	110.2	110.0	113.5	105.9	111.5	117.2	110.5	108.0	109.8	122.9	117.4
1945	116.0	114.4	125.9	112.7	115.4	114.2	116.9	112.2	111.5	115.1	107.6	114.0	118.4	114.3	111.4	111.6	129.9	121.8
1946	129.3	126.8	146.3	125.6	129.7	128.2	124.9	123.4	124.2	127.3	119.0	123.2	133.0	124.6	126.5	121.4	152.2	141.7
1947	147.9	144.6	171.1	165.6	149.6	144.3	140.9	141.9	144.4	142.4	139.3	142.9	146.8	139.1	145.0	136.3	177.9	165.6

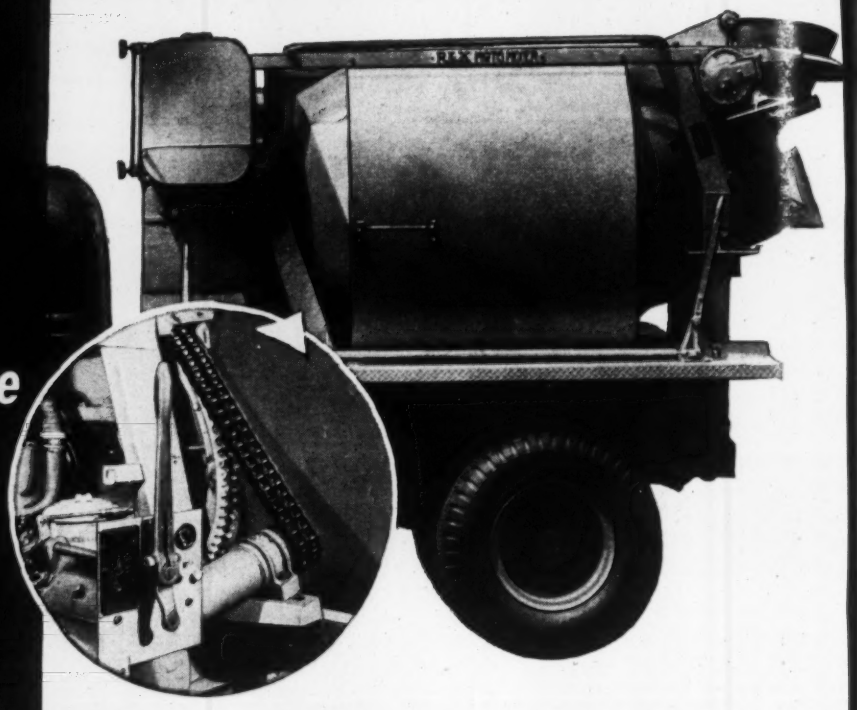
Index of Union Weekly Hours in Each Building Trade (1939 = 100)

Year	All Building Trades	Journeymen	Helpers & Laborers	Bricklayers	Carpenters	Cement Finishers	Electricians (Inside Wiring)	Glaziers	Lathers	Painters	Plasterers	Plumbers & Gas Fitters	Sheet Metal Workers	Steam & Sprinkler Fitters	Stonemasons	Structural Ironworkers	Building Laborers	Hod Carriers
1907	124.3	123.8	126.1	122.9	121.0	122.7	124.2	.....	.....	131.1	125.8	120.6	117.0	120.3	118.4	121.3	121.6	118.9
1908	122.4	122.0	123.5	120.3	119.2	121.6	123.3	.....	.....	131.0	125.2	120.7	116.9	120.3	118.4	118.9	121.6	118.9
1909	120.7	120.5	121.0	117.8	117.8	112.5	122.5	.....	.....	129.2	125.2	120.7	116.9	120.0	118.4	117.3	121.2	118.5
1910	119.2	119.1	118.8	115.6	116.4	122.3	121.8	.....	.....	127.5	125.1	120.5	116.9	119.3	116.6	116.0	118.3	117.5
1911	118.8	118.7	118.6	115.1	115.8	121.1	121.6	.....	.....	126.7	125.8	120.2	116.6	119.2	115.8	115.8	118.3	116.9
1912	118.4	118.3	118.3	115.1	115.7	121.1	121.2	.....	121.8	126.6	124.3	119.2	115.1	118.4	115.8	114.6	118.3	116.0
1913	118.2	118.0	118.3	114.9	115.6	119.8	120.7	.....	121.8	125.9	124.3	119.2	114.9	118.0	115.7	114.1	118.3	116.0
1914	117.7	117.7	117.6	114.4	115.1	119.0	120.3	.....	121.8	125.6	125.2	118.8	114.8	116.5	115.7	113.9	117.9	114.5
1915	117.6	117.6	117.5	114.3	115.1	119.0	119.6	.....	121.2	125.6	123.6	118.8	114.6	116.5	115.6	113.9	117.9	114.5
1916	117.2	117.1	117.2	114.1	115.1	117.2	118.6	.....	121.2	124.7	122.3	118.2	114.1	116.1	115.4	113.6	117.3	114.5
1917	116.9	116.9	116.7	113.7	115.1	115.9	118.1	.....	120.6	124.6	122.2	118.1	114.0	116.0	115.3	113.4	116.0	114.4
1918	116.3	116.2	116.3	113.7	113.9	115.3	117.3	118.0	120.6	124.0	121.9	117.1	112.8	114.9	115.3	113.0	115.5	114.4
1919	115.7	115.7	115.2	113.5	113.2	114.4	116.3	118.0	120.3	123.8	121.9	116.7	112.3	114.8	114.6	112.8	113.3	114.0
1920	115.1	115.2	114.5	113.4	113.3	113.8	116.0	117.5	119.6	120.2	121.6	116.7	111.9	114.7	114.6	112.8	112.1	113.8
1921	115.0	115.1	114.5	113.4	113.2	113.8	116.0	118.3	119.3	120.3	121.3	116.5	111.9	114.6	114.7	112.8	112.1	113.8
1922	115.0	115.2	114.2	113.4	113.3	113.7	116.0	118.1	119.4	121.2	121.4	116.5	111.8	114.6	114.6	112.8	111.3	114.0
1923	115.1	115.3	114.4	113.4	113.7	113.7	116.0	117.5	119.8	120.9	122.0	116.5	111.8	114.6	114.6	112.8	112.1	114.0
1924	115.1	115.3	114.4	113.3	113.5	113.7	115.9	117.5	119.6	120.8	122.1	116.5	111.8	114.6	114.3	112.8	111.8	113.9
1925	115.1	115.3	114.2	113.2	113.5	113.4	115.9	117.1	119.2	121.1	121.7	116.5	111.8	114.6	114.3	112.5	111.9	113.8
1926	114.9	115.1	113.9	113.3	113.5	113.4	115.9	116.5	118.9	120.7	118.2	116.5	111.8	114.4	114.5	112.8	112.1	113.9
1927	114.7	114.8	113.9	112.7	113.5	113.0	115.9	117.9	118.3	120.2	117.7	116.2	111.4	114.2	114.3	112.8	112.3	113.9
1928	114.0	114.0	113.8	112.7	112.9	112.4	115.3	117.4	117.7	117.0	116.7	116.2	111.1	114.2	114.2	112.7	112.2	113.9
1929	113.0	113.3	111.5	109.8	112.9	112.5	112.6	116.1	117.1	116.7	115.6	115.2	111.0	113.6	110.9	112.2	112.1	107.6
1930	109.8	110.0	109.0	107.1	109.4	108.1	109.9	112.4	110.4	115.5	113.0	109.9	106.9	108.5	107.1	108.8	110.0	106.9
1931	108.5	108.5	108.1	105.5	107.7	106.9	108.8	110.5	109.8	114.4	112.1	108.4	105.1	107.4	105.2	107.5	108.7	106.3
1932	106.5	106.6	105.7	103.1	105.0	105.6	106.2	107.9	109.3	114.2	110.0	108.0	102.5	106.4	104.8	104.8	104.9	104.0
1933	106.2	106.2	105.2	104.2	103.4	107.6	106.2	107.9	108.8	114.0	112.4	107.5	103.5	105.8	104.0	104.5	104.5	103.4
1934	102.3	102.3	101.9	102.4	102.5	103.7	99.9	102.3	102.5	99.9	107.6	106.5	102.0	105.1	103.5	103.0	99.9	101.5
1935	101.5	101.5	101.2	102.3	102.0	103.5	95.8	101.6	102.3	99.8	105.9	105.8	102.1	104.8	103.4	101.8	99.8	101.4
1936	101.5	101.5	101.4	02.3	102.1	103.0	96.2	102.0	101.3	100.2	104.2	104.4	102.0	105.0	103.4	101.7	100.3	101.2
1937	101.9	101.9	101.8	103.3	101.9	103.1	100.9	102.1	102.7	100.2	104.3	105.0	102.1	105.1	103.4	101.2	100.6	101.5
1938	100.2	100.1	100.2	100.0	100.0	100.0	100.3	100.2	100.8	110.4	100.0	99.7	100.0	99.6	100.0	100.1	100.1	100.3
1939	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1940	99.9	100.0	99.4	99.7	100.0	100.2	100.0	100.0	99.8	100.5	99.2	99.0	100.0	100.0	99.9	100.0	99.4	99.9
1941	100.3	100.5	99.7	99.9	100.6	100.7	100.6	100.6	100.7	100.7	100.0	99.4	100.8	100.6	100.0	100.4	99.7	99.8
1942	101.1	101.8	98.8	100.8	100.8	100.6	104.6	102.0	102.5	106.5	102.0	99.9	100.9	102.2	100.2	101.1	98.8	98.6
1943	101.0	102.0	98.1	100.8	100.8	100.6	104.6	102.0	103.4	106.5	106.0	101.8	100.9	102.2	100.2	101.1	97.4	98.4
1944	101.2	102.2	98.1	100.8	101.1	100.6	104.6	102.0	103.6	106.8	106.1	101.8	100.9	102.2	100.2	101.1	97.4	98.4
1945	101.2	102.2	98.1	100.8	101.1	100.6	104.6	102.0	103.6	106.8	106.1	101.8	100.9	102.2	100.2	101.1	97.4	98.4
1946	100.2	101.1	97.4	100.3	100.3	100.4	100.5	102.0	102.2	106.1	104.1	98.3	100.8	101.3	100.0	101.1	97.2	96.9
1947	100.1	100.9	97.4	99.8	100.2	100.0	100.5	103.5	162.2	106.2	103.0	97.3	100.1	101.3	99.3	101.1	97.2	96.4

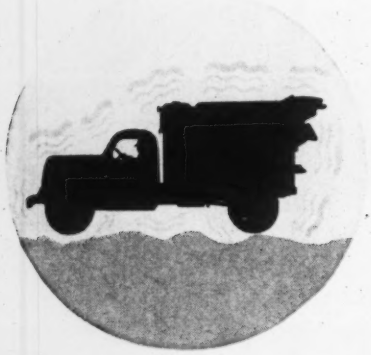
Wage Rates per Hour New York City

	Carpenters, 10 Hr. Day	Bricklayers, 8 Hr. Day	Masons' Laborers, 8 Hr. Day	Common Laborers, 10 Hr. Day	Structural Iron-Workers
1874	$0.23	$0.43	$0.18	$0.14	.....
1875	.22½	.37	.18	.14	.....
1876	.21	.31	.17	.14	.....
1877	.20	.31	.15	.12	.....
1878	.18	.31	.15	.11	.....
1879	.17	.31	.16	.11	.....
1880	.18	.34	.18	.12	.....
1881	.19	.46	.21	.13	.....
1882	.21	.50	.22	.15	.....
1883	.21	.50	.23	.13	.....
1884	.21	.50	.22	.13	.....
1885	.20	.50	.22	.13	.....
1886	.21	.50	.23	.13	.....
1887	.21	.50	.20	.14	.....
1888	.22	.50	.16	.12	.....
1889	.22	.50	.23	.13	.....
	8 Hr. Day			9 Hr. Day	
1890	.43	.47	.28	.14	.....
1891	.43	.47	.28	.14	.....
1892	.44	.50	.29	.14	.....
1893	.43	.50	.30	.14	.....
1894	.44	.50	.30	.14	.....
1895	.43	.50	.30	.14	.....
1896	.44	.50	.30	.14	.....
1897	.44	.50	.29	.14	.....
1898	.44	.50	.30	.14	.....
1899	.45	.55	.33	.14	.....
1900	.50	.56	.33	.14	.....
1901	.50	.59	.33	.19	.....
1902	.51	.65	.36	.17	.....
1903	.56	.65	.36	.16	.....
1904	.53	.65	.36	.19	.....
1905	.54	.70	.36	.20	.....
1906	.58	.70	.38	.21	.....
				—8 Hr. Day—	
1907	.62½	.70	.37½	.22	$0.60
1908	.62½	.70	.37½	.22	.60
1909	.62½	.70	.37½	.22	.60
1910	.62½	.70	.37½	.22	.62½
1911	.62½	.70	.37½	.22	.62½
1912	.62½	.70	.37½	.23	.62½
1913	.62½	.70	.37½	.22½	.62½
1914	.62½	.75	.37½	.22½	.62½
1915	.62½	.75	.37½	.25	.62½
1916	.62½	.75	.37½	.25	.66
1917	.69	.75	.42½	.30	.68
1918	.69	.81	.47	.40½	.80
1919	.75	.87½	.57½	.40½	.87½
1920	1.12½	1.25	.77½	.75	1.12½
1921	1.12½	1.25	.87½	.60	1.12½
1922	1.12½	1.25	.87½	.60	1.12½
1923	1.12½	1.50	.95	.61½	1.12½
1924	1.31½	1.50	1.00	.68½	1.29
1925	1.31½	1.50	1.00	.65½	1.46½
1926	1.45	1.64½	1.07	.81½	1.60
1927	1.50	1.75	1.12½	.90½	1.75
1928	1.50	1.75	1.12½	.90½	1.75
1929	1.55	1.84	1.15	.98½	1.81
1930	1.65	1.92½	1.03½	1.03½	1.92½
1931	1.45	1.71½	1.02½	.65½	1.92½
1932	1.33	1.47	1.00	.64½	1.67½
1933	1.37½	1.57½	.91	.72½	1.65
1934	1.40	1.53	.82½	.84½	1.62
1935	1.40	1.50	.82½	.68	1.65
1936	1.40	1.50	.82½	.65	1.58
1937	1.60	1.73	.91	.76	1.79
	—7 Hr. Day—				
1938	1.75	1.88½	.99½	.91½	1.92½
1939	1.75	1.89½	1.03½	.91½	1.92½
1940	1.81	1.96	1.03½	.91½	1.96½
1941	1.85	2.00	1.03½	.93¾	2.00
1942	1.85	2.00	1.03½	.95	2.00
1943	1.85	2.00	1.03½	.95	2.00
1944	1.85	2.00	1.0885	.954	2.00
1945	1.85	2.00	1.10	1.06	2.00
1946	2.10	2.25	1.23½	1.2042	2.25
1947	2.467	2.646	1.438	1.438	2.563
		1946 by months			
Jan.	2.10	2.25	1.20	1.20	2.25
Feb.	2.10	2.25	1.20	1.20	2.25
Mar.	2.10	2.25	1.20	1.20	2.25
Apr.	2.10	2.25	1.20	1.20	2.25
May	2.10	2.25	1.25	1.20	2.25
June	2.10	2.25	1.25	1.20	2.25
July	2.10	2.25	1.25	1.20	2.25
Aug.	2.10	2.25	1.25	1.20	2.25
Sept.	2.10	2.25	1.25	1.20	2.25
Oct.	2.10	2.25	1.25	1.20	2.25
Nov.	2.10	2.25	1.25	1.20	2.25
Dec.	2.10	2.25	1.25	1.25	2.25
		1947 by months			
Jan.	2.10	2.50	1.25	1.25	2.25
Feb.	2.50	2.50	1.25	1.25	2.50
Mar.	2.50	2.50	1.25	1.25	2.50
April	2.50	2.50	1.50	1.50	2.50
May	2.50	2.50	1.50	1.50	2.50
June	2.50	2.75	1.50	1.50	2.50
July	2.50	2.75	1.50	1.50	2.50
Aug.	2.50	2.75	1.50	1.50	2.50
Sept.	2.50	2.75	1.50	1.50	2.75
Oct.	2.50	2.75	1.50	1.50	2.75
Nov.	2.50	2.75	1.50	1.50	2.75
Dec.	2.50	2.75	1.50	1.50	2.75
		1948 by months			
Jan.	2.50	2.75	1.50	1.50	2.75
Feb.	2.75	2.75	1.50	1.50	3.00
Mar.	2.75	2.75	1.50	1.50	3.00
April	2.75	2.75	1.50	1.50	3.00
May	2.75	2.75	1.50	1.70	3.00

What the REX Chain Drum Drive Means to You!

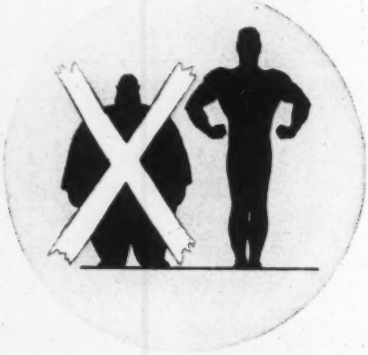


NO STRAIN WITH CHAIN



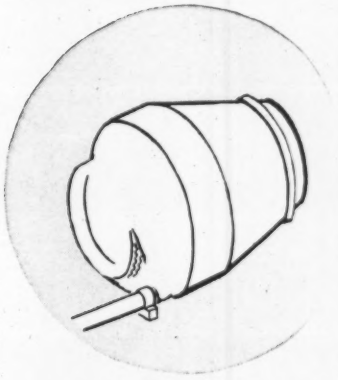
Eliminates Binding..... Accommodates Misalignments

Truck mixers are subjected to severe twists and strains as the truck weaves over rough roads. To protect transmission, gears, shafting, power plant . . . to prevent destructive binding action between drum and transmission, Rex Moto-Mixers employ the exclusive chain drum drive. This flexible drive absorbs the shocks and accommodates the *unavoidable* misalignments to which all truck mixers are subjected.



Permits Proper Weight Distribution

Thanks to the Rex Chain Drum Drive, weight can be correctly distributed in Rex Moto-Mixers. There is no need for excessively heavy frames and transmission cases or complicated transmissions, to overcome the effects of misalignment and strains. And weight saved here can be properly distributed to parts where it is needed most . . . bearings, shafting, blades, drum rollers, drum shell, drum supports.



Provides a Uniform Application of Power

The Rex Chain Drum Drive wraps more than halfway around the drum sprocket and more than one-third around the drive pinion to provide a uniform application of positive power. This positive power is applied to the drum over many sprocket teeth. Contrast this design to the gear drives of other truck mixers where the point of contact between drum gear and drive pinion is concentrated on a single gear tooth.

LONGEST LIFE . . . LOWEST MAINTENANCE . . . MORE PROFIT FOR YOU!

Have your Rex Distributor show you how the Chain Drum Drive means more profit to you. Chain Belt Company, 1633 West Bruce Street, Milwaukee 4, Wis.

CHAIN BELT

. . . REX CONSTRUCTION MACHINERY

COMPANY

Wage Rates per Hour
Chicago (Cook County)

Chicago Builders Directory and Guide

	Bricklayers	Carpenters	Electrical Workers	Cement Finishers	Laborers
1900	$.50	$.425	$.50	$.425	$.25
1901	.50	.425	.50	.425	.25
1902	.55	.45	.50	.425	.30
1903	.55	.45	.50	.425	.30
1904	.60	.50	.5625	.50	.30
1908	.625	.5625	.6225	.55	.35
1909	.675	.60	.685	.575	.375
1910	.675	.60	.685	.575	.375
1911	.70	.60	.75	.625	.375
1912	.725	.65	.75	.625	.40
1913	.75	.65	.75	.65	.40
1914	.75	.65	.75	.65	.40
1915	.75	.70	.75	.65	.40
1916	.75	.70	.75	.675	.425
1917	.75	.70	.75	.725	.45
1918	.875	.80	.875	.75	.575
1919	1.00	1.00	1.00	1.00	.70
1920	1.25	1.25	1.25	1.00	1.00
1921	1.10	1.00	1.10	.85–1.25	.725
1922	1.10	1.00	1.10	.85	.725
1923	1.25	1.15	1.25	1.10	.825
1924	1.50	1.15–1.25	1.375	1.25	.825
1925	1.50	1.15–1.375	1.50	1.375	.875
1926	1.625	1.50	1.50	1.50	.90
1927	1.625	1.50	1.625	1.50	.90
1928	1.625	1.50	1.625	1.50	.90
1929	1.625	1.5625	1.625	1.5625	.95
1930	1.70	1.625	1.70	1.625	.975
1931	1.70	1.625	1.70	1.625	.975
1932	1.375	1.3125	1.25–1.50	1.3125	.825
1933	1.375	1.3125	1.25–1.50	1.3125	.825
1934	1.50	1.3125	1.0625–1.50	1.3125	.825
1935	1.50	1.3125	1.50	1.3125	.825
1936	1.50	1.50	1.50	1.50	.95
1937	1.70	1.625	1.70	1.625	1.025
1938	1.70	1.625	1.70	1.625	1.025
1939	1.70	1.625	1.70	1.625	1.025
1940	1.70	1.625	1.70	1.625	1.025
1941	1.70	1.625	1.70	1.625	1.025
1942	1.75	1.70	1.70	1.70	1.10
1943	1.75	1.70	1.70	1.70	1.10
1944	1.75	1.70	1.70	1.70	1.10
1945	1.90	1.85	1.85	1.8375	1.20
1946	2.00	1.95	1.975	1.95	1.30
1947	2.20	2.15	2.15	2.15	1.50

	Painters	Plumbers	Pipe Fitters	Structural Iron Workers	Plasterers
1900	$.375	$.50	$.50	$.45	$.50
1901	.375	.50	.50	.45	.50
1902	.40	.50	.50	.50	.50
1903	.40	.50	.50	.50	.50
1904	.40	.5625	.5625	.5625	.5625
1908	.50	.65	.59375	.60	.6875
1909	.55	.685	.685	.625	.6875
1910	.60	.685	.685	.65	.6875
1911	.60	.685	.685	.65	.6875
1912	.60	.75	.725	.68	.75
1913	.65	.75	.75	.68	.75
1914	.70	.75	.75	.68	.75
1915	.70	.75	.75	.68	.75
1916	.70	.75	.75	.70	.75
1917	.725	.75	.75	.70	.75
1918	.75	.8125	.8125	.875	.875
1919	.875	1.00	1.00	1.00	1.00
1920	1.25	1.25	1.25	1.00	1.00–1.25
1921	.95	.95	.95	1.05–1.25	1.10
1922	.95	.95	.95	1.05	1.10
1923	.95	1.15	1.25	1.25	1.25
1924	1.25	1.25	1.375	1.25	1.50
1925	1.50	1.25	1.50	1.375	1.50
1926	1.50	1.50	1.5625	1.50	1.625
1927	1.625	1.625	1.625	1.50	1.625
1928	1.625	1.625	1.625	1.50	1.625
1929	1.625	1.625	1.625	1.625	1.625
1930	1.75	1.70	1.70	1.625	1.70
1931	1.75	1.70	1.70	1.675	1.70
1932	1.41	1.375	1.375	1.35	1.375
1933	1.00	1.375	1.375	1.35	1.375
1934	1.333	1.375	1.375	1.35	1.50
1935	1.333	1.50	1.50	1.425	1.50
1936	1.50	1.50	1.50	1.50	1.50
1937	1.666	1.70	1.70	1.625	1.70
1938	1.666	1.70	1.70	1.70	1.70
1939	1.666	1.70	1.70	1.70	1.70
1940	1.666	1.70	1.70	1.70	1.70
1941	1.833	1.70	1.70	1.70	1.70
1942	1.725	1.70	1.70	1.76	1.825
1943	1.725	1.70	1.70	1.76	1.825
1944	1.725	1.70	1.70	1.76	1.825
1945	1.816	1.85	1.85	1.88	1.90
1946	1.95	1.95	1.95	1.95	2.00
1947	2.15	2.15	2.15	2.20	2.225

Canadian Wage Rates for 8 Building Trades in 11 Cities
1939 and December 1, 1947

1939 rates from Dept. of Labour; 1947 rates from Canadian Construction Association

	Bricklayers		Carpenters		Electricians		Painters	
	1939	1947	1939	1947	1939	1947	1939	1947
Halifax	$1.00	$1.33	$ .70	$1.11	$ .85	$1.23	$ .60	$ .95
Saint John	.90	1.35	.50–.60	.95	.50–.65	.95	.50–.55	.87
Quebec	.75–.85	1.15	.55–.60	.95	.55–.65	.95	.50–.55	.90
Montreal	.80–.90	1.40–1.75*	.70	1.06	.75	1.11	.66	.95–1.00
Toronto	1.00	1.60	.90	1.35	1.00	1.45	.75	1.15
Hamilton	.90	1.45	.75	1.25	.75	1.20	.65	1.05
Windsor	1.15	1.50	.95	1.35	1.15	1.50	.60–.65	1.10–1.25
Winnipeg	1.10	1.45	.85	1.25	.85	1.25	.70	1.10
Saskatoon	1.00	1.40–1.50	.50–.75	1.20–1.30	.70–.80	1.20	.50–.70	.90
Edmonton	1.10	1.60	.90	1.25	.85	1.265	.80	1.10
Vancouver	1.10	1.60	.75–.90	1.40	.75–1.00	1.50	.63–.80	1.20

*$1.17 is the official union rate.

	Plasterers		Plumbers		Sheetmetal Workers		Labourers	
	1939	1947	1939	1947	1939	1947	1939	1947
Halifax	$ .80	$1.21	$ .85	$1.19	$ .70	$ .99	$ .30–.40	$ .50–.70
Saint John	.90	1.35	.60–.70	1.05	.50–.65	.95	.30–.40	.55–.65
Quebec	.75	1.15	.55–.65	.95	.55–.65	.95	.40	.70
Montreal	.80	1.40*	.75	1.40	.65–.75	1.06	.40	.70
Toronto	.90	1.50	1.00	1.48	.93	1.46	.35–.58	.80–.95
Hamilton	.90	1.45	.85	1.42	.75	.90–1.25	.35–.45	.65–.80
Windsor	.90	1.40	1.00	1.50	.70–.85	1.35	.55	.80–.95
Winnipeg	1.10	1.45	.95	1.35	.70	.95	.40–.45	.70–.80
Saskatoon	.75–1.00	1.00–1.25	1.00	1.35	.75–.90	.80–1.15	.30–.40	.65–.75
Edmonton	1.05	1.60	1.05	1.35	.90	1.30	.40–.50	.80
Vancouver	1.00	1.475	1.00	1.35	1.00	1.48	.45–.50	.90–1.00

*$1.17 is the official union rate.

Note: Vacation Pay Assessments for above trades are as follows: Toronto—4% (except for painters and sheetmetal workers), Hamilton—2%, Windsor—2%, Winnipeg—2%, Saskatoon—4%, Edmonton—2-4%, and Vancouver—2½%.

Australian Building Wages and Basic Building Materials Prices
in Melbourne, Victoria, Australia
1939 and February 1, 1948

The Building Industry Congress, Melbourne, Australia, John O'Keefe, Executive Director, has sent the accompanying price and wage data for Melbourne, to *Engineering News-Record* to illustrate how prices and wages are moving on the other side of the world.

Mr. O'Keefe reports: "Based on the firm conviction that knowledge of the trends of building in America is a fairly reliable indicator of business prosperity in the States, we, in Australia, are assisted by the reports appearing in *Engineering News-Record* giving the monthly index numbers of Construction Costs and Building Costs."

The Melbourne Building Industry Congress is now studying and testing the setting up of construction and building cost indexes in Australia so designed that direct comparison can be made with corresponding cost trends in the United States. The initial test series will be confined to the state of Victoria.

The price and wage data supplied for this year's Construction Cost number of *Engineering News-Record* are shown in dollars converted at the prevailing rate for the Australian £ for the date shown. The percentage increase in 1948 in U.S.A. exchange is considerably lower than in Australian currency due to the lower dollar conversion rate in 1948.

Basic Building Material Prices

		1939	1948
Conversion rate Australian £		$3.7505	$3.2350
BRICKS:	1st Quality per 1,000 ex kiln	12.75	19.25
CEMENT:	Per ton ex works	13.97	15.69
TIMBER:	4½" x ½" Kiln dried Hardwood Flooring per 100 Lin. Feet	3.84	4.25
TIMBER:	Hardwood Weatherboards Kiln dried Round Edge per 100 Lin. Feet	3.94	4.29
TILES:	Terra Cotta Roofing per 1000	50.63	61.46

PERCENTAGE INCREASE AT THE RESPECTIVE AUSTRALIAN AND AMERICAN RATES:

	Australian	U. S. A. Exchange
BRICKS	75.0%	51.0%
CEMENT	30.2%	12.3%
TIMBER—Flooring	28.0%	10.7%
Weatherboards	26.2%	8.9%
TILES	40.7%	21.4%

Weekly Rate Paid

	1939	1948
Carpenters	$21.47	$30.60
Bricklayers	22.69	30.60
Painters	19.35	30.60
Plasterers	20.63	30.60
Tile Layers	21.66	30.60
Tuck Pointers	20.16	30.60
Plumbers	22.06	30.60
Labourers—		
Skilled	17.06	25.88
Unskilled	17.06	25.26

"Casual" Employees

In 1939 the following provision was inserted in the Determination for Builders' Labourers:—

"Wages of Casual Employees. Builders' Labourers shall, subject to the conditions set out, be deemed to be and shall be paid as casual employees for the first six months of their employment. At the end of six months, employees who have been continuously employed for that period without loss of time on all usual working days and with loss of time if such is not due to the fault of the employee shall be deemed thereafter to be continuously employed and shall be paid not less than the weekly rate prescribed."

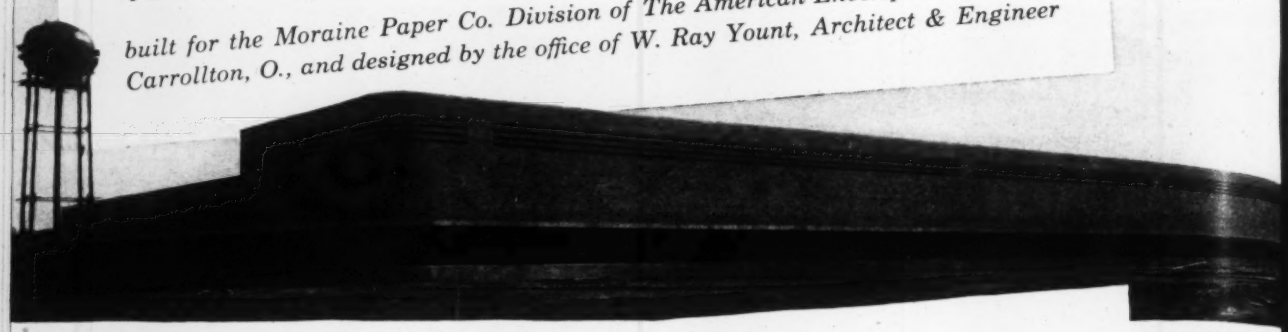
In 1939, the rate per week was £5.3 ($19.32) for casual labourers. Since pre-war days the additional amenities granted to building tradesmen under their appropriate Court Awards include traveling allowances, wet weather pay, holiday pay, sick pay, etc.

Mexico City Prices

(See table on page 131)

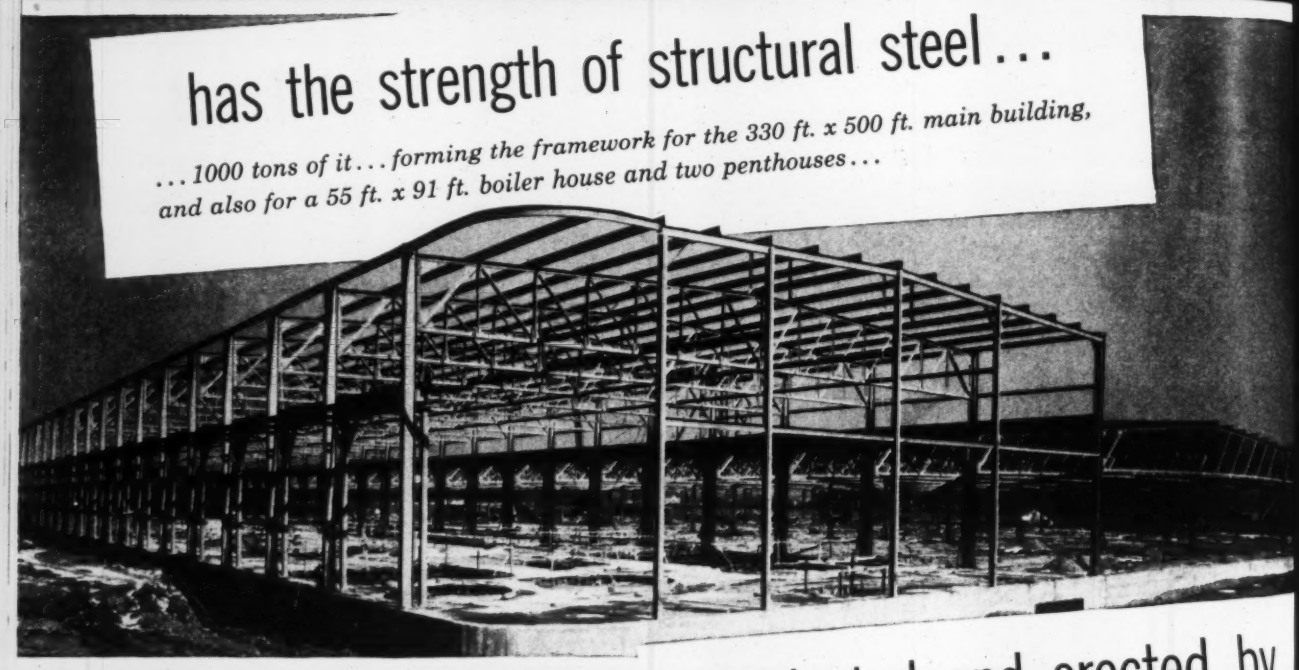
This modern, good looking mill building...

built for the Moraine Paper Co. Division of The American Envelope Co. at West Carrollton, O., and designed by the office of W. Ray Yount, Architect & Engineer



has the strength of structural steel...

...1000 tons of it... forming the framework for the 330 ft. x 500 ft. main building, and also for a 55 ft. x 91 ft. boiler house and two penthouses...



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Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
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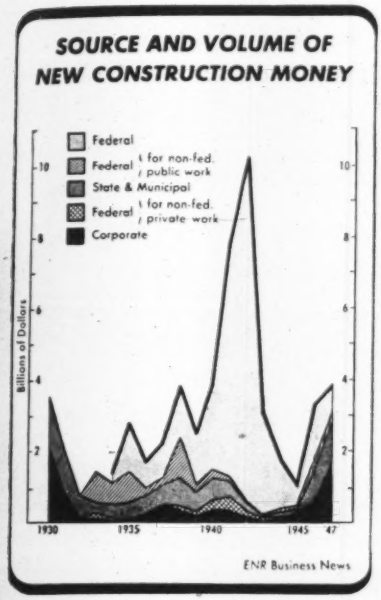
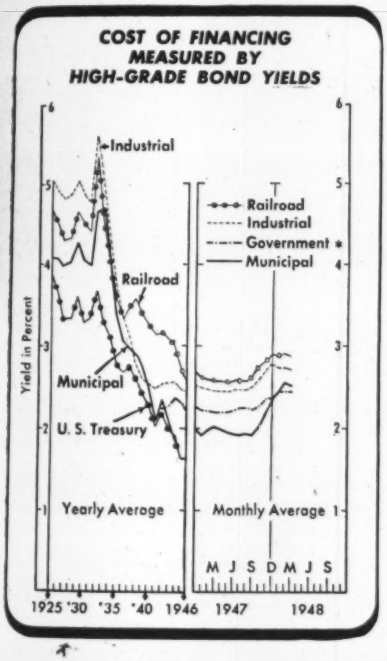
UNITED STATES STEEL





Cost of Financing

The yield of government, municipal, industrial, public utility and railroad bonds in 1947, as reported by Standard Statistics and Poors, rose from 2 to 23 percent above the 1946 annual averages. The annual average yield of 15 high-grade, long-term municipal bonds showed the greatest increase, rising to 2.01 from the 1946 average of 1.64, or 23 percent. Other high-grade bonds showed gains over 1946 in the following order: public utilities, 4 percent; industrials, 3 percent and government and railroad bonds, 2 percent.

The rising trend in high-grade bond yields was continued in the first quarter of 1948. Municipal bond yields for the three-month period, January through March, 1948, rose to an average of 2.51, a gain of 25 percent over the 1947 annual average of 2.01 and 53 percent over the 1946 average of 1.64.

Public utility bond yields in the first quarter of 1948 rose to an average of 2.85, 10 percent above the 1947 average of 2.59 and 14 percent above the 1946 average of 2.50. Railroad bond yields and long-term government bond yields in the first quarter averaged 9 and 11 percent, respectively, above the 1947 and 1946 averages. Railroad bond yields rose to 2.87 from 2.63 in 1947 and from 2.59 in 1946; government bond yields rose to 2.44 from 2.24 in 1947 and 2.19 in 1946.

Industrial bond yields for the first three months of 1947 averaged 2.71, 8 percent above the 1946 average of 2.52 and 11 percent above the 1945 average of 2.44.

Commercial loan rates charged by banks in 19 principal cities during 1947 averaged 2.55, 3 percent below the 1946 average of 2.64. The rates in seven Northern and Eastern cities declined to 2.33 in 1947 from the 1946 annual average of 2.43, or 4 percent. Commercial loan rates charged by banks in eleven principal Southern and Western cities declined 2 percent in 1947 to an annual average of 2.33 from the 1946 average of 2.43. New York City loan rates, however, showed a decline of only .05 percent, dropping to 1.81 from 1.82 in the preceding year.

Bond Yields—Percent

	Govt.* (1)	U. S. Treas. (2)	Municipal (3)	Industrial (4)	Pub. Util. (5)	Railroad (6)
1933		3.31	4.71	4.98	4.69	4.55
1934		3.12	4.03	4.28	4.19	4.01
1935		2.79	3.41	3.73	3.59	3.58
1936		2.69	3.07	3.34	3.38	3.31
1937		2.74	3.10	3.16	3.22	3.45
1938		2.61	2.91	2.82	2.99	3.60
1939		2.41	2.76	2.64	2.83	3.39
1940		2.26	2.50	2.57	2.75	3.26
1941		2.05	2.10	2.50	2.69	3.16
1942	2.27	2.09	2.36	2.54	2.71	3.17
1943	2.29	1.98	2.06	2.55	2.63	3.10
1944	2.38	1.92	1.86	2.58	2.64	3.01
1945	2.34	1.66	1.67	2.50	2.59	2.75
1946	2.19	Disc	1.64	2.44	2.50	2.59
1947	2.24		2.01	2.52	2.59	2.63
1947						
J	2.21		1.92	2.49	2.55	2.60
F	2.20		1.99	2.47	2.56	2.58
M	2.18		2.02	2.46	2.57	2.57
A	2.18		1.98	2.45	2.53	2.56
M	2.18		1.95	2.45	2.52	2.56
J	2.20		1.92	2.46	2.53	2.58
J	2.24		1.91	2.46	2.53	2.57
A	2.24		1.93	2.46	2.52	2.57
S	2.22		1.92	2.50	2.56	2.61
O	2.26		2.02	2.59	2.68	2.73
N	2.35		2.18	2.69	2.74	2.79
D	2.38		2.35	2.77	2.84	2.89
1948						
J	2.44		2.45	2.72	2.85	2.86
F	2.44		2.55	2.72	2.86	2.88
M	2.44		2.52	2.70	2.83	2.87

(1)* Standard Statistics & Poors—aver. long-term government bonds, taxable. To replace the long-term U. S. Treasury bonds series discontinued after December, 1945.

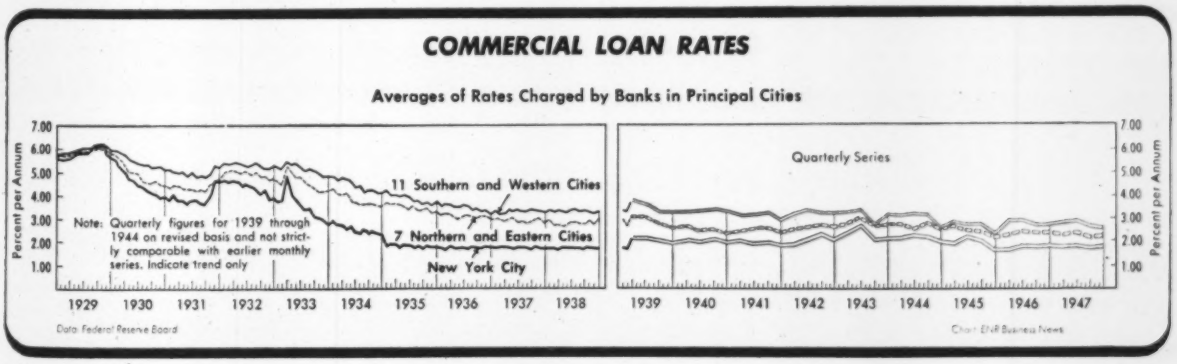
(2) Aver. yield of long-term U. S. Treasury bonds, partially tax exempt, not due or callable for fifteen years. Federal Reserve Bulletin.

(3) Standard Statistics & Poors—aver. 15 high-grade long-term municipals.

(4) Standard Statistics & Poors—aver. A1 plus industrials.

(5) Standard Statistics & Poors—aver. A1 plus public utilities.

(6) Standard Statistics & Poors—aver. A1 plus railroads.


COMMERCIAL LOAN RATES
Averages of Rates Charged by Banks in Principal Cities
Percent per Annum
11 Southern and Western Cities
7 Northern and Eastern Cities
New York City
Note: Quarterly figures for 1939 through 1944 on revised basis and not strictly comparable with earlier monthly series. Indicate trend only
Quarterly Series
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947
Data: Federal Reserve Board
Chart: ENR Business News

VIBRATION

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BETTER ROADS FOR A BETTER WORLD
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VIBRATION — applied to horizontal cutting blades at 2000 VPM — is the revolutionary principle of subgrade excavation employed by the new PRECISION SUBGRADER . . . the latest BLAW-KNOX contribution to the mechanization of concrete paving construction.

We've been job-proving this machine for two years . . . and it has done a masterful job of cutting its way through all kinds of material . . . always leaving a precision subgrade, ready for concreting.

THE BLAW-KNOX PRECISION SUBGRADER is ready for you now. It is one-man operated and easily handles subgrade preparation for maximum paving mixer production.

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CONSTRUCTION EQUIPMENT

Bulletin No. 2227 TELLS ALL Send for it

Roadbuilding Costs

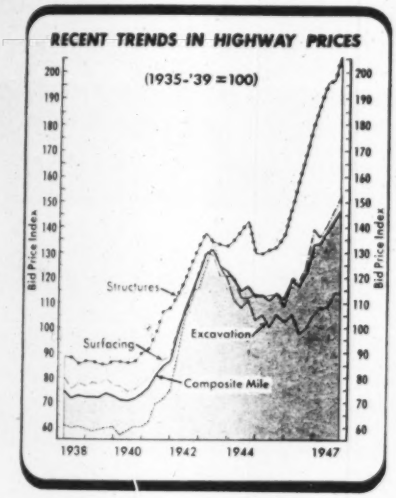
The index of the average annual cost of constructing a composite standard mile of highway rose to an all-time high in 1947 of 140.4. This was a 14 percent increase over the 1946 average of 122.9.

The Public Roads Administration Index is based on average prices in the 1925-1929 period for a composite mile of road. It is made up of three basic factors, the cost of excavation, surfacing and of structures. The quantities used for establishing the composite mile are considered as constant for the index, but in actual practice they vary from job to job.

Highway excavation bid price averaged 39¢ per cubic yard in 1947, the second highest since 1925 and 8 percent higher than the 1946 average of 36¢. The highest average bid price in the past 22 years was 44¢ in 1943. Throughout the year of 1947 the bid prices ranged from 38¢ in the first quarter to 40¢ in the final quarter of the year.

Surfacing costs in 1947 rose to a new high averaging $3.20 per square yard. This was an increase of 15 percent over the 1946 average of $2.78. The bid price ranged from $3.01 per square yard in the first quarter of 1947 to $3.38 in the last quarter.

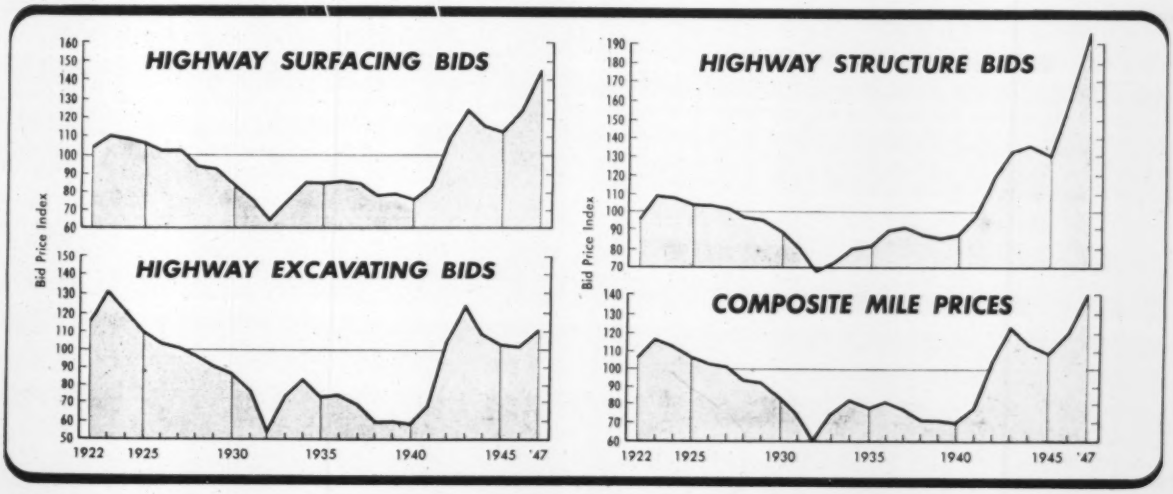
The structures index rose to a new record high of 196.9 in 1947 from 164.7 in 1946, a gain of 20 percent. The component parts of the structures index: reinforcing steel, structural steel, and structural concrete, established new highs, averaging $.093 per lb., $.132 per lb., and $45.84 per cu. yd., respectively, in 1947.



Public Roads Administration
Price Trend in Highway Construction for Composite Standard Mile

Year	Excavation[1] (17,491* cubic yards)		Surfacing[2] (3,726* square yards)		Structures				Composite mile
					Reinforcing steel (16,000* pounds)	Structural steel (4,325* pounds)	Structural concrete (68* cubic yards)	Combined	
	Bid price[3]	Sub-index	Bid price[3]	Sub-index	Bid price[3]	Bid price[3]	Bid price[3]	Sub-index	Index
Base period, 1925 to 1929..	$0.35†	100.0	$2.22†	100.0	$0.052†	$0.067†	$22.15†	100.0	100.0
1922	.40	114.5	2.28	102.7	.050	.074	20.18	95.1	105.8
1923	.47	133.3	2.43	109.5	.057	.078	23.37	108.6	117.9
1924	.43	122.2	2.40	108.3	.057	.077	22.91	107.2	113.1
1925	.39	110.0	2.36	106.4	.056	.067	22.53	103.9	107.5
1926	.36	103.7	2.29	103.1	.053	.074	22.76	103.7	103.4
1927	.35	100.3	2.29	103.3	.051	.071	22.65	101.5	101.9
1928	.34	96.0	2.10	94.5	.049	.067	21.22	96.1	95.3
1929	.32	90.0	2.05	92.7	.048	.059	21.58	95.0	92.1
1930	.30	86.3	1.86	84.1	.045	.061	20.08	89.4	85.7
1931	.27	77.6	1.68	75.6	.040	.054	18.02	79.9	76.8
1932	.18	55.0	1.44	64.8	.034	.046	15.33	68.0	61.0
1933	.26	74.0	1.67	75.1	.038	.046	16.15	72.2	78.7
1934	.29	83.3	1.90	85.8	.043	.053	17.73	80.8	84.0
1935	.26	73.3	1.90	85.6	.044	.052	17.78	81.5	80.6
1936	.26	74.8	1.91	86.0	.046	.060	20.25	90.0	82.9
1937	.24	69.0	1.89	85.1	.048	.066	19.76	91.5	79.4
1938	.21	59.8	1.72	77.5	.045	.063	19.06	87.2	73.8
1939	.21	59.8	1.73	77.8	.044	.059	19.13	85.9	73.6
1940	.21	59.2	1.68	75.6	.045	.063	19.17	87.6	71.6
1941	.24	69.2	1.89	85.2	.054	.076	21.44	100.8	81.8
1942	.37	105.5	2.44	109.7	.065	.090	26.16	122.3	109.9
1943	.44	125.6	2.78	125.7	.067	.095	30.19	134.4	126.9
1944	.38	108.3	2.54	114.3	.064	.089	31.94	136.5	115.5
1945	.36	102.6	2.48	111.8	.062	.077	31.62	132.5	111.7
1946	.36	101.9	2.78	125.3	.075	.113	38.79	164.7	122.9
1947									
1st Quarter...	.38	108.3	3.01	135.7	.088	.134	43.35	188.1	133.9
2d Quarter...	.38	108.3	3.14	141.6	.092	.126	46.14	196.5	138.0
3d Quarter...	.40	114.0	3.26	147.0	.093	.128	46.14	197.5	142.9
4th Quarter...	.40	114.0	3.38	152.4	.097	.138	47.71	205.6	146.7
Average.....	.39	111.2	3.20	144.2	.093	.132	45.84	196.9	140.4

[1] Common excavation plus other excavation items expressed as equivalent common excavation.
[2] Portland-cement concrete plus other surfacing items expressed as equivalent portland-cement concrete.
[3] Indexes and totals were calculated with the bid prices carried to one more decimal place than that to which they shown in this table.
Column showing amount of bid price times fixed quantity omitted in this table.
* Fixed quantities used for establishing composite mile for price trend.
† Fixed prices used for establishing composite mile index base.



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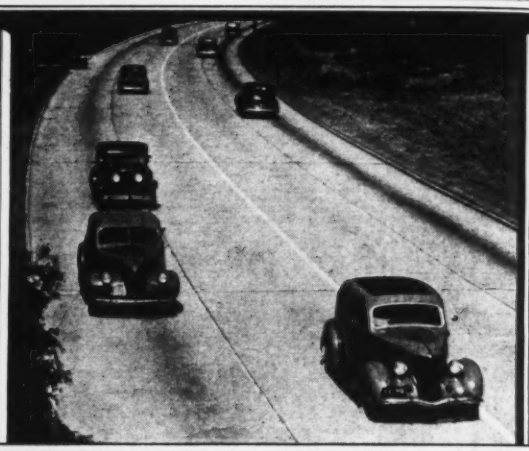
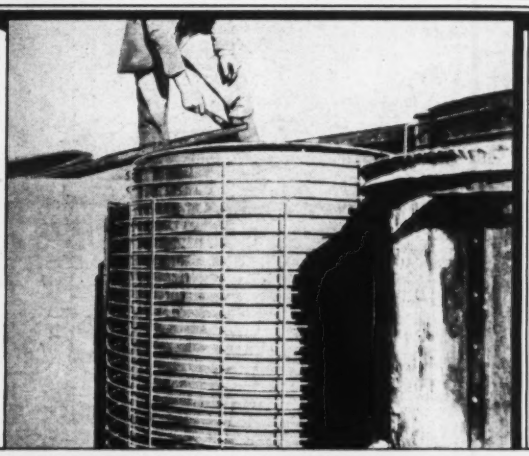


ROAD or floor sections, tunnel—sewer—or tank sections, and other concrete forms of standard design can be built for less money and in shorter time by using Clinton Welded Wire Fabric for the reinforcing.

Clinton Fabric is supplied in rolls or sheets cut to your specifications. It is easy to store, handle and use. It is electrically welded, accurately spaced to coincide with lines of stress of concrete, and is high in tensile strength. Time-consuming spacing and bar tying is eliminated. Savings in labor are noteworthy and contract termination dates are easier to meet.

On your next job calling for concrete reinforcement, specify, and be sure you get, Clinton Welded Wire Fabric.



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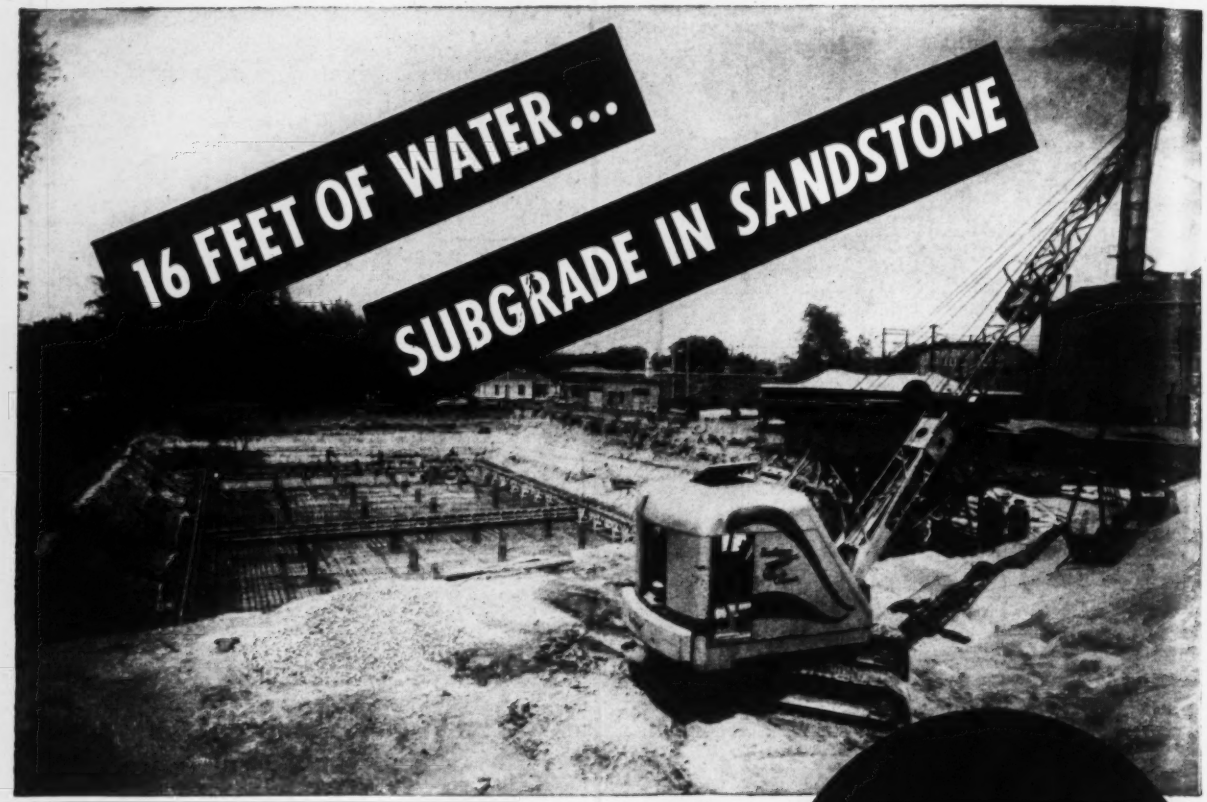
AVERAGE BID PRICES FOR HIGHWAY CONSTRUCTION BY STATES—FOURTH QUARTER, 1947

Projects Utilizing Federal-Aid Highway Funds
Public Roads Administration, Federal Works Agency

	Ala.	Ariz.	Ark.	Cal.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	Ill.	Ind.	Iowa	Kan.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	Miss.	Mo.	Mont.	Neb.
Roadway Excavation, per cu. yd.																										
Borrow		.64		1.06	1.46	.51		.70			.39	.47	.54			.52	.39	.48	1.04	.70	.64	.45	.41		.57	
Common	.32		.33			1.12	1.00			.29	.27	.52	.41	.23	.22		.36	.48		.58	.40	.45	.42	.43	.34	
Unclassified	.48	.97	3.00	.54	.68			.65	.37	.28	.47	.42						.64				.31			.46	.21
Rock, Solid	1.27		1.15			1.12					.68	4.75	1.18	1.55	1.10				1.33							
Structural Excavation, per cu. yd.																		3.80		2.81	3.95	1.10		1.58		
Common, Dry			5.07		2.96			6.63			2.08			3.43	3.98	4.01		1.80		2.72	2.86	2.29		5.58	11.37	
Unclassified	4.57	1.98		2.35		2.85				2.26	3.25				2.55	7.32	1.10		1.42		5.63	3.09	20.00	3.07	5.31	4.51
Steel, per lb.																										
Pavement Reinforcement								.067				.062	1.05							.057	.61					
Structural Reinforcement	.092	.111	.099	.087	.111	.100		.067	.099	.093	.107	.099	.097	.107	.090	.098	.101	.08	.10	.093	.077	.112	.101	.096	.128	.10
Structural Steel	.123	.161	.144	.133	134				.154	.095	251	125	.129	.134	1.33	.144	.156			.110	.115	1.52	.135	131	.157	.142
Bases, per sq. yd.																										
Gravel and Clay Gravel	.24	.18	.64	.68	.30				.24	.22	.27	.41	.71				.55	.35				.19			.35	
Macadam or Stone		.88				1.52	1.70		1.11	.85	.34	.84	1.40	.79	1.00	2.68			2.00	.71		.21		.60		
Portland Cement Concrete				1.62			3.00					4.32									4.40	2.80		9.85		
Surfaces, per sq. yd.																										
Gravel and Clay Gravel					.16						.22	.61	1.55	.07	.08	.31	1.21		.50		.28	.10	.26	.18	.25	.08
Bituminous Surface Treatment	.24	.21		.21					.28	.32	.14	.31	.27	.24	.12		.39						.34	.14	.19	
Bituminous Road-Mix			.59	.35	.45				.76	.69	.47	.74			.53	1.27		.38				.23			.32	
Bituminous Intermediate Surfaces	.26	.48		.84		1.11			1.42			.97	3.00						1.90	.82		.60				
Bituminous Concrete			.95	2.07			1.59		.73	.94		1.48				1.40				.79	.91			.72		
Portland Cement Concrete		3.80		2.66				3.36		3.46		3.95	2.56		3.80		3.07			3.31	2.97		2.32	2.93		
Pipe, per lin. ft.																										
Cast Iron, 18-inch								86.00																		
Clay, 6-inch				.89					1.31					.75							.85	1.50				
Concrete Reinforced, 24-inch	4.39	4.49	4.35	5.49		3.39			5.50	3.61		4.80		4.26	3.66	4.56	4.58		6.00	5.06	4.43	4.85	5.09	4.38	5.33	
Galvanized Iron, 24-inch		4.11	4.11	4.47	5.09					3.63	3.75	4.19	5.26	3.68	3.46	4.07		3.75			3.50	4.10		4.06	4.59	3.33
Structural Concrete, per cu. yd																										
Superstructures	54.76	53.79	53.05	50.62	65.45	45.73		39.84	61.60	49.42	45.77	64.31	50.19	44.45	42.12	43.09	53.23	35.00		39.98	41.21	51.87	51.51	50.87	50.97	44.34
Substructures	56.18	45.06	52.39		62.28	41.66			55.31	41.16	45.33	59.98	47.30	40.95	34.14	41.09		39.00	60.00	28.93	40.09	47.76	56.97	50.29	55.03	43.81
Foundations and Footings	57.16			42.39	62.09	41.66			56.44	40.07	46.03		42.21							28.38	36.02	49.45	54.58			

	Nev.	N. H.	N. J.	N. M.	N. Y.	N. C.	N. D.	Ohio	Okla.	Ore.	Pa.	R. I.	S. C.	S. D.	Tenn.	Tex.	Utah	Vt.	Va.	Wash.	W. Va.	Wis.	Wyo.	U. S. Aver.	Hawaii	Puerto Rico
Roadway Excavation, per cu. yd.																										
Borrow	1.14	.57	1.15			.36		.72			1.08				.85	.43		.74	.63	.60	.49	.51	.50	**65**		.74
Common		1.00	.52			.34	.15			.39		.85	.41			.51		.67		.31		.45		**36**		
Unclassified	.35	1.50		.66	.54	.32		.60	.45	.66	.98	1.00	.41	.25	.62	.39	.53	1.09	.86	.67	.97	.41	.41	**51**	.54	.49
Rock, Solid		1.41	1.44							1.23						1.26		2.44		.91		1.12		**1.12**		
Structural Excavation, per cu. yd.																										
Common, Dry			3.16			10.71		4.99	5.35						3.37	4.50	1.85		5.50		4.11		2.69	**5.68**		
Unclassified	2.17	8.00	10.00	2.11	1.98	4.34		3.87	2.05	4.23	5.17			5.25	3.19	6.24	3.42	2.56	10.52	2.01	2.86	9.26	4.50	**4.00**	2.20	3.71
Steel, per lb.																										
Pavement Reinforcement					.071			.073			.072					.07			.088		1.06			**.069**		
Structural Reinforcement	.118	.087	.143	.085	.108	.095		.099	.09	.099	.097		.102	.12	.088	.093	.109	.104	.092	.094	.100	.096	.12	**.095**	.13	.104
Structural Steel	.55	.20	.10	.104	.133	.107		.132	.097		.141		.138	.139	.158	.105	.151		.131	.167	.13	.141	.153	**.134**		.113
Bases, per sq. yd.																										
Gravel and Clay Gravel	.18	.44		.20	.46			1.23	.68	.40				.10	.37	.39	.17	.52	.77	.23	.23	.31	.31	**.37**		
Macadam or Stone			1.13		.96	.81		1.44		.74	1.79				.69				1.19	.33	1.50			**.90**	1.32	1.17
Portland Cement Concrete					2.81			4.11			6.10	1.93				2.17						3.18		**2.83**		
Surfaces, per sq. yd.																										
Gravel and Clay Gravel		.17					.13	.76	.22					.18			.18			.15		.15		**.17**		
Bituminous Surface Treatment		.13			.26	.34		.29	.34	.32	.66		.33		.17	.17		.26	.31	.23		1.24		**.24**		.33
Bituminous Road-Mix	.40	.97		.47		.75		.43			.53			.57	.39		.34	.34				.42	.36	**.52**		.71
Bituminous Intermediate Surfaces			1.60			.31		1.25		.49	1.00						1.57		.67					**.77**		1.16
Bituminous Concrete			1.59		1.21			.97		1.46	1.33	1.06	1.21			.52				.99	.64	2.18		**.98**	1.53	
Portland Cement Concrete					3.76	4.43		3.70	2.01		4.34				3.19	2.74	4.30		3.04		4.25	2.72		**3.26**	5.96	5.23
Pipe, per lin. ft.																										
Cast Iron, 18-inch			3.50								10.54													**15.48**		
Clay, 6-inch					.89			1.31			1.52									.94				**1.16**		
Concrete Reinforced, 24-inch		4.57	6.21	5.89	6.95	4.35	3.50	8.61	4.67	4.57	6.43		3.86	4.92	4.39	3.95		4.48	4.75	4.73	4.80	4.47		**4.93**	6.15	4.09
Galvanized Iron, 24-inch	5.20			3.97	7.85	4.69	3.60	5.19	4.07	5.45	4.92			4.75	4.82	4.37	3.99	4.81	4.39			10.00	4.64	**4.34**		
Structural Concrete, per cu. yd.																										
Superstructures		48.00	55.74	33.00	49.50	56.15		59.48	37.18	65.12	45.96		60.63	50.63	65.89	40.39	51.35	52.40	55.33	64.20	56.24	46.22	42.91	**47.53**		39.84
Substructures	58.12	46.08	46.00	32.34	46.91	53.68		47.61	43.31	63.89	34.96		53.77	51.30	48.16	42.40	52.16	50.76	56.36	51.31	51.99	46.15	45.05	**44.68**	54.02	
Foundations and Footings		42.11	44.91		45.78	53.93		33.98	48.03	54.35			60.51	50.68	47.82				56.35	47.57	49.85	46.42		**41.62**		21.13

Note: The rates shown are the weighted average contract bid prices for contract quantities reported on.



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MORETRENCH WELLPOINT SYSTEM

Sixteen feet of water in a mixture of clay, fine sand, and gravel—*with subgrade in sandstone!* That was the unusual dewatering problem presented on the underground reservoir project pictured here.

To pull the water down below grade, Moretrench Wellpoints had to be installed a foot or two in the sandstone. This difficult installation—key to the success of the job—was carefully made by an ace Moretrench supervisor.

Pumping continuously for eight months, Moretrench Wellpoint Equipment enabled the contractor to carry on construction in the dry. Banks were sloped. No bracing or sheeting was necessary.

Call in Moretrench on *your* difficult dewatering jobs.

Concrete Underground Reservoir, Fairbury, Nebraska. Contractor: Chambers Construction Co., Lincoln, Nebraska. Engineers: Harold Hoskins and Associates, Lincoln, Nebraska.

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90 West St. New York 6 | 3037 S. Christiana Ave. Chicago 23, Illinois | 7701 Interbay Blvd. Tampa 6, Florida | 315 W. 25th St. Houston 8, Texas | Rockaway New Jersey

BASE RATES ON COMPENSATION INSURANCE FOR CONSTRUCTION—APRIL 1, 1948

Data Compiled by Herbert L. Jamison & Co., Insurance Advisers and Auditors, New York, N. Y.
(Base rates in effect April 1, 1948—subject to increase or decrease according to experience ratings)

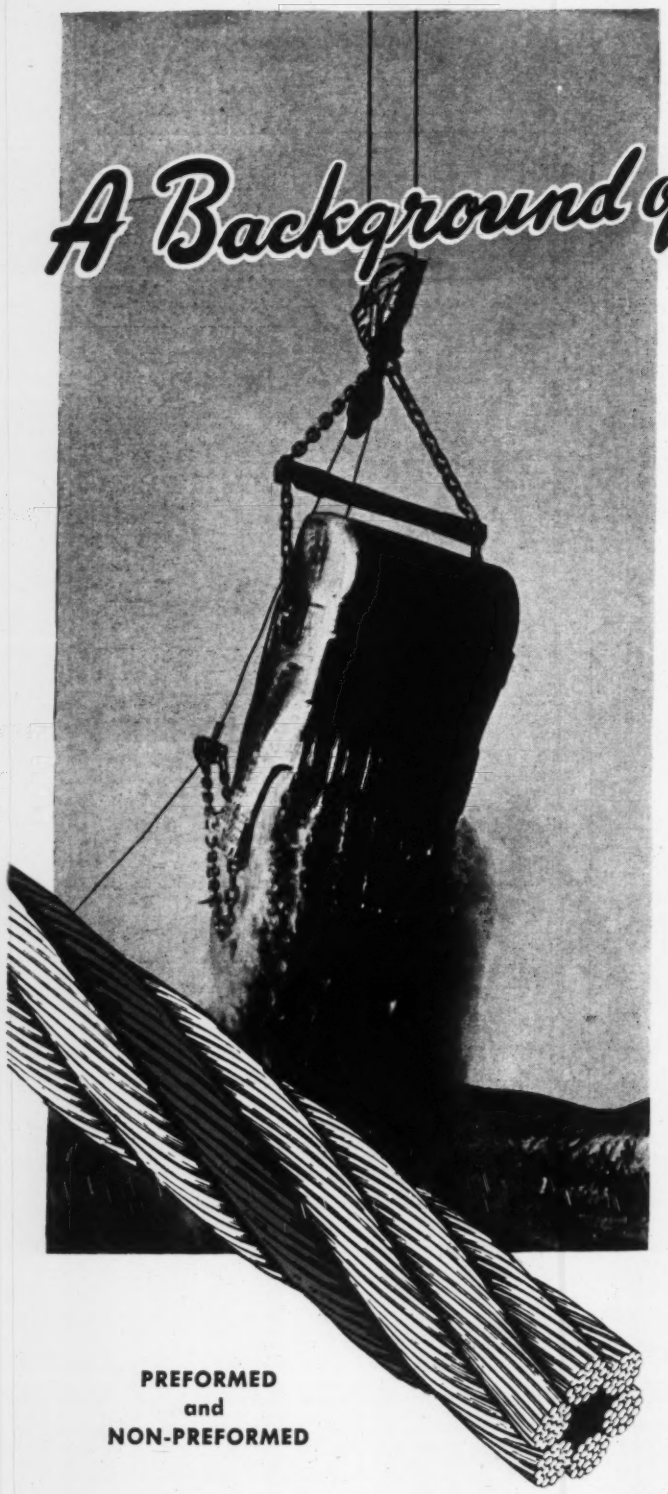
Classification of Work (A)	Ala. (N)	Alas.	Ariz.	Ark.	Cal.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	Ill.	Ind.	Iowa	Kans. (N)	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	Miss.(E)	Mo.	Mont.	Neb.
1. Carpentry — private residence	1.37	3.47	5.56	3.74	4.09	2.27	3.34	1.75	1.92	2.26	1.59	2.85	2.34	2.46	2.68	2.89	2.47	3.66	1.80	1.76	2.75	3.40	3.33	1.85	3.07	3.32	2.85
2. Carpentry — 3 stories or less	1.37	3.95	5.56	3.74	4.09	2.27	3.34	1.75	1.92	2.26	1.59	2.85	3.07	2.89	2.68	2.89	2.47	3.72	1.80	2.02	2.75	3.40	3.33	1.85	3.07	3.32	2.85
3. Carpentry — interior trim	.81	2.34	5.56	2.23	4.09	.98	2.03	1.75	1.32	.98	1.02	1.41	1.21	1.08	1.12	1.27	1.04	1.59	1.16	1.81	1.65	2.00	3.33	1.34	3.07	1.62	1.26
4. Carpentry — general	2.07	7.94	5.56	6.32	4.09	2.78	4.84	1.75	2.59	2.26	3.36	4.16	3.65	2.89	2.68	3.91	3.03	3.84	4.02	3.46	6.19	3.40	3.33	6.70	3.07	5.50	2.85
5. Concrete or cement walk laying (B)	1.01	2.76	6.33	2.46	1.53	1.19	2.06	1.00	1.12	1.34	1.44	1.76	1.35	1.28	1.35	1.57	1.24	1.95	1.45	2.02	1.73	1.60	1.63	1.76	2.04	2.01	1.57
6. Concrete work — general (B)	2.34	7.14	6.33	4.30	3.53	2.64	4.98	1.50	3.79	2.52	2.20	4.62	2.90	2.24	3.01	3.74	2.70	4.01	2.70	2.72	4.01	3.21	3.28	6.75	4.97	4.98	2.72
7. Concrete work — dwellings — 3 stories or less (B)	1.01	6.75	6.33	3.16	3.53	2.21	3.24	1.50	2.82	1.82	1.07	2.28	2.17	1.33	1.44	2.10	1.19	2.40	2.31	2.08	4.56	1.65	2.13	3.88	2.42	2.61	2.00
8. Concrete — bridges	3.52	(L)	13.83	9.76	6.68	3.99	9.58	1.50	5.95	3.91	4.17	6.28	4.14	4.30	5.97	5.04	4.08	4.83	6.87	5.88	14.01	5.11	6.49	10.13	8.69	7.38	5.47
9. Electric wiring	1.08	1.83	2.83	2.30	2.25	1.16	2.00	.90	1.11	1.31	1.31	1.58	1.21	1.14	1.70	1.32	1.19	1.35	1.14	1.71	1.32	1.23	1.25	1.58	1.65	1.80	1.69
10. Excavation — earth (C)	1.88	3.82	5.61	3.62	2.58	3.32	4.00	1.00	1.93	1.89	1.46	4.85	1.87	1.46	2.29	3.05	1.98	1.79	2.50	2.64	3.68	2.03	2.73	4.14	2.92	5.34	1.84
11. Excavation — rock (D)	2.88	9.09	11.33	7.59	6.71	3.39	7.12	1.00	4.27	3.85	3.54	5.66	4.25	3.83	3.71	4.64	3.83	5.45	3.69	4.53	7.90	4.60	5.35	6.71	6.98	6.13	4.74
12. Glazing	2.34	4.33	5.52	5.70	5.22	2.72	5.44	.60	2.95	3.07	2.70	4.16	2.96	3.06	3.01	3.69	3.06	4.35	3.11	3.64	3.80	3.40	4.15	2.50	4.37	4.88	3.53
13. Insulation	1.18	3.50	(L)	3.26	3.70	1.60	2.50	.....	1.67	1.62	(L)	2.36	1.80	1.66	1.71	2.11	1.66	2.09	1.84	2.10	2.84	1.88	2.27	1.63	2.55	2.71	2.06
14. Lathing	1.10	3.50	4.07	2.97	3.70	1.29	2.66	.70	1.42	1.27	1.34	(L)	1.38	1.44	1.45	1.72	1.42	2.09	1.53	1.76	2.39	1.78	1.78	1.67	3.11	2.23	1.69
15. Masonry	1.01	5.95	4.39	3.16	2.68	2.21	3.24	.80	1.84	1.82	1.07	2.28	2.29	1.33	1.44	2.10	1.19	2.40	2.31	2.08	4.56	1.65	2.13	3.88	2.42	2.61	2.00
16. Painting (J)	1.76	4.77	5.29	4.05	3.89	2.23	4.21	1.00	1.95	1.84	1.88	3.25	1.92	2.13	2.29	2.37	2.11	2.75	1.97	2.77	(K)12.77	2.63	2.45	2.08	3.26	3.83	2.65
17. Plastering — interior	1.18	3.50	3.57	3.26	3.70	1.60	2.50	.70	1.67	1.62	1.17	2.36	1.80	1.66	1.71	2.11	1.66	2.27	1.84	2.10	2.84	1.88	2.27	1.63	2.55	2.71	2.06
18. Plumbing	.78	1.82	2.40	1.90	1.48	1.06	2.18	.60	1.20	1.01	.89	1.68	1.28	1.26	1.19	1.15	1.17	1.85	1.56	1.62	1.61	1.50	1.82	2.65	1.59	1.94	1.55
19. Pile driving other than wharf	5.56	9.10	15.56	15.24	9.74	7.11	6.24	4.00	6.68	5.33	5.44	(L)	5.74	7.13	5.79	9.66	7.60	12.79	3.83	5.46	4.89	8.70	7.91	15.71	17.37	12.63	9.18
20. Roofing	3.58	8.95	9.78	9.94	8.26	4.67	10.78	1.20	5.47	3.95	3.39	8.00	4.78	4.76	6.91	7.40	4.62	6.69	6.09	8.10	8.90	6.81	7.31	5.23	6.66	9.40	7.37
21. Sheet metal erection	1.63	3.04	4.53	3.70	2.93	1.77	3.92	1.20	1.90	1.76	1.68	2.39	2.08	1.91	2.11	1.98	2.06	3.20	1.89	2.05	1.86	1.66	1.67	4.22	2.29	2.76	2.48
22. Steel erection — general	5.90	11.05	20.31	16.40	7.26	7.31	9.96	3.50	10.68	6.16	5.42	11.40	5.96	4.41	10.05	8.69	6.21	8.98	8.05	7.83	13.70	6.06	8.46	13.24	9.92	13.33	9.36
23. Steel erection — structural	9.25	19.60	20.31	19.10	12.92	11.85	14.80	3.50	13.49	8.95	7.96	16.08	9.32	6.96	13.57	13.15	9.75	8.98	9.88	10.87	16.37	17.57	8.49	18.22	18.29	19.25	12.22
24. Steel erection — interior ornamental	1.59	4.59	3.89	4.17	3.52	1.86	3.81	1.75	2.73	2.05	1.88	(L)	2.33	2.09	2.06	2.52	2.04	3.07	2.19	2.53	2.94	2.36	2.92	4.96	3.85	3.24	2.41
25. Steel erection — dwellings 2 stories or less	3.81	10.77	8.04	10.06	12.92	4.67	8.80	3.50	4.81	4.98	4.79	7.18	5.80	4.04	4.84	6.52	5.32	6.41	5.64	6.13	13.70	6.82	6.59	9.43	9.45	8.82	5.62
26. Steel sash and door	1.51	5.21	3.89	3.67	3.52	1.78	3.68	3.50	1.95	2.12	1.81	(L)	2.78	1.98	1.98	2.37	1.96	2.91	2.09	2.40	2.94	2.55	2.78	4.96	3.29	3.08	2.32
27. Tile, marble or stone setting — interior	.72	1.11	2.46	1.91	1.49	.83	1.79	.35	1.47	.92	.90	1.22	1.05	.93	.96	1.10	.90	1.37	1.03	1.32	1.41	1.60	1.47	.94	1.72	1.40	1.10
28. Watchman and timekeepers	1.61	5.95	1.99	3.50	(G)	1.91	3.95	(G)	2.06	2.13	1.98	2.75	2.45	2.09	2.14	2.52	2.03	3.10	2.23	2.54	3.10	2.51	2.95	3.65	3.88	3.19	2.48
29. Waterproofing: Application by means of brush	1.76	4.77	4.94	4.05	3.89	2.23	4.21	(L)	1.95	1.84	1.88	3.25	1.92	2.13	2.29	2.37	2.11	2.75	1.97	2.77	(K)12.77	2.63	2.45	2.08	3.26	3.83	2.65
Application by means of trowel (Int.)	1.18	3.50	4.94	3.26	3.89	1.60	2.50	(L)	1.67	1.62	1.17	2.36	1.80	1.66	1.71	2.11	1.66	2.27	1.84	2.10	2.84	1.88	2.27	1.63	2.55	2.71	2.06
Application by means of trowel (Ext.)	1.01	5.95	4.94	3.16	3.89	2.21	3.24	(L)	1.84	1.82	1.07	2.28	2.29	1.33	1.44	2.10	1.19	2.40	2.31	2.08	4.56	1.65	2.13	3.88	2.42	2.61	2.00
Application by means of pressure gun	2.34	7.14	4.94	4.30	3.89	2.64	4.98	(L)	3.79	2.52	2.20	4.62	2.90	2.24	3.01	3.74	2.70	4.01	2.70	2.72	4.01	3.21	3.28	6.75	4.97	4.98	2.72
30. Wrecking (I)	9.30	15.99	28.43	22.76	19.68	10.98	20.95	10.00	11.78	12.34	10.31	(L)	12.04	8.06	12.03	11.27	11.96	20.57	12.47	15.03	16.32	25.04	12.68	16.52	16.02	19.51	14.16

Classification of Work (A)	Nev. (F)	N. H.	N. J.	N. M.	N. Y.	N. C.	N. D. (F)	Ohio(F, O)	Okla.	Ore. (H)	Pa.	R. I.	S. C.	S. D.	Tenn.	Texas	Utah	Vt.	Va.	Wash. (H)	W. Va. (F)	Wis.	Wyo. (F)
1. Carpentry — private residence		2.34	4.30	2.04	5.66	1.88		1.20	5.00	6.36	1.65	5.85	3.15	1.55	2.13	2.82	1.85	2.27	1.66	4.59		3.98	
2. Carpentry — 3 stories or less		2.34	4.30	2.04	5.66	1.88		1.20	5.00	6.36	1.65	5.85	3.15	1.55	2.13	3.66	1.85	2.27	1.66	4.59		3.98	
3. Carpentry — interior trim		1.40	2.80	.97	5.66	1.32		1.05	2.60	2.94	1.65	4.40	2.02	1.15	1.32	2.17	1.85	.95	.96	1.50		3.98	
4. Carpentry — general		4.76	5.40	3.19	5.66	2.50		1.05	6.37	7.49	1.65	12.70	7.11	1.55	4.30	3.66	1.85	3.01	2.38	6.08		3.98	
5. Concrete or cement walk laying (B)		1.71	2.50	1.21	3.44	1.34		.75	2.88	3.19	1.90	5.29	2.84	1.39	1.60	1.93	1.42	1.20	.91	2.30		2.23	
6. Concrete work — general (B)		5.18	6.50	2.39	5.34	3.11		1.20	7.01	6.69	2.75	7.20	6.29	2.39	2.06	3.66	3.19	2.58	2.04	5.15		3.89	
7. Concrete work — dwellings — 3 stories or less (B)		2.92	5.80	1.48	5.34	1.40		1.20	4.53	5.83	2.75	6.29	2.57	1.41	1.67	3.66	2.41	2.38	1.14	4.48		2.48	
8. Concrete — bridges		6.79	7.60	4.69	10.05	5.41		.....	11.72	9.84	2.75	19.80	12.85	4.37	6.44	10.77	5.35	4.16	3.73	7.57		7.89	
9. Electric wiring		1.47	1.50	1.02	3.07	1.40		.70	2.45	3.29	1.10	3.01	2.40	1.20	1.32	2.22	1.40	1.02	1.09	2.53		2.39	
10. Excavation — earth (C)		3.35	5.60	4.30	4.97	1.62		.95	4.23	7.46	1.90	10.52	3.95	2.05	1.99	2.97	3.24	2.85	1.55	5.39		4.00	
11. Excavation — rock (D)		4.83	9.33	3.35	11.34	6.54		9.50	8.99	(L)	1.90	16.42	8.10	3.78	5.39	7.29	4.21	3.24	3.44	10.49		7.37	
12. Glazing		3.78	5.50	2.68	10.60	3.47		1.50	7.18	6.73	1.10	13.09	6.51	2.80	3.59	5.47	1.20	2.60	2.49	5.17		6.53	
13. Insulation		2.24	4.20	1.55	5.18	1.85		.....	3.95	(L)	(L)	7.08	3.30	1.77	1.94	(L)	3.27	1.52	1.25	(L)		3.05	
14. Lathing		1.83	4.20	1.31	3.15	1.67		.65	3.45	5.72	.95	6.08	3.01	1.44	1.75	2.91	1.83	1.26	1.21	4.04		3.19	
15. Masonry		2.92	6.30	1.48	7.15	1.40		1.35	4.53	5.83	1.45	6.29	2.57	1.41	1.67	3.66	2.12	2.38	1.14	4.48		2.48	
16. Painting (J)		2.98	6.60	2.04	7.52	2.08		1.50	4.03	6.67	2.20	7.57	4.70	2.39	2.06	2.48	1.94	2.01	1.39	5.13		2.21	
17. Plastering — interior		2.24	4.20	1.55	5.18	1.85		.65	3.95	5.72	.95	7.08	3.30	1.77	1.94	2.84	3.27	1.52	1.25	4.04		3.33	
18. Plumbing		1.65	2.60	1.21	3.27	1.22		.85	2.10	2.91	1.00	3.32	2.23	1.43	1.13	2.01	.98	1.37	.96	2.24		1.69	
19. Pile driving other than wharf		5.00	6.90	7.02	7.93	9.34		.....	19.08	15.90	4.25	13.71	11.80	7.54	9.40	13.57	7.01	3.40	4.81	11.67		12.13	
20. Roofing		7.89	9.70	6.54	17.35	4.43		3.70	18.22	15.59	2.25	18.91	8.85	5.37	4.64	7.60	5.37	4.97	4.29	(L)		10.64	
21. Sheet metal erection		2.21	2.85	1.58	5.60	2.14		3.70	3.97	6.42	2.25	8.28	2.74	1.74	2.23	2.91	2.15	1.55	1.80	4.59		3.28	
22. Steel erection — general		10.09	11.20	6.70	15.68	11.53		4.25	14.86	(L)	6.00	36.29	16.35	6.89	7.88	10.51	8.31	6.81	5.59	12.98		8.52	
23. Steel erection — structural		14.10	16.20	10.68	26.11	13.74		4.25	23.61	25.39	6.00	45.82	24.20	9.76	10.41	11.79	8.31	9.51	7.05	19.52		9.96	
24. Steel erection — interior ornamental		2.61	(L)	1.87	4.84	2.35		3.70	5.05	5.94	3.25	8.83	4.26	2.06	2.54	4.02	1.80	1.79	1.73	4.57		3.85	
25. Steel erection — dwellings 2 stories or less		6.91	8.70	4.83	13.10	5.48		3.70	10.62	12.19	6.00	22.63	11.61	4.00	6.38	10.51	5.97	4.56	4.06	9.53		6.26	
26. Steel sash and door		2.49	3.70	1.77	5.90	2.25			4.77	3.55	6.00	8.35	3.78	1.98	2.39	3.79	1.80	1.69	1.64	(L)		4.37	
27. Tile, marble or stone setting — interior		1.20	1.85	.86	4.35	1.03		.65	2.27	2.10	.65	3.74	1.85	1.01	1.17	1.66	2.28	.85	.80	1.62		1.51	
28. Watchman and timekeepers		2.61	(L)	1.85	8.02	2.35		.75	5.04	5.45	(G)	8.69	3.68	2.17	2.56	(G)	2.39	1.84	1.80	4.69		4.37	
29. Waterproofing: Application by means of brush		2.98	5.30	2.04	7.52	2.08		3.70	4.03	6.67	(L)	7.57	4.70	2.39	2.06	2.48	1.94	2.01	1.39	5.13		2.21	
Application by means of trowel (Int.)		2.24	5.30	1.55	5.18	1.85		.75	3.95	5.72	(L)	7.08	3.30	1.77	1.94	2.84	3.27	1.52	1.25	4.04		3.33	
Application by means of trowel (Ext.)		2.92	5.30	1.48	7.15	1.40		3.70	4.53	5.83	(L)	6.29	2.57	1.41	1.67	3.66	2.12	2.38	1.14	4.48		2.48	
Application by means of pressure gun		5.18	5.30	2.39	5.34	3.11		3.70	7.01	6.69	(L)	7.20	6.29	2.39	2.06	3.66	3.19	2.58	2.04	5.15		3.89	
30. Wrecking (I)		15.13	24.00	10.79	(M)	13.90		5.80	30.76	32.43	15.00	44.82	25.16	11.42	11.98	26.39	22.52	10.43	10.41	24.93		22.53	

Nevada Industrial Commission, Carson City, Nev. — State Insurance Plan
North Dakota State Plan: Workmen's Compensation Bureau, Bismarck, N. D.
West Virginia State Plan: State Compensation Commission, Charleston, W. Va.
Wyoming State Plan: Manager, Workmen's Compensation Dept., State Treasurer's Office, Cheyenne, Wyoming

Notes: (A) Special rates for government projects. (B) Includes construction of forms. (C) Includes blasting, but not caisson or coffer dam work. (D) Special rates for occupational disease. (E) Employers liability rates no compensation law.
(F) Compensation must be insured in Monopolistic State Fund. (G) Assign operation to principal classification. (H) Operation specified as hazardous by law must be insured in State Fund. (I) Not available if general contractor is conducting operations at job. (J) Painting of bridges and steel structures rated as steel erection. (K) Work indoors — rate 1.45 in Mass. (L) Rate available only on application to company. (M) Wrecking of structures based on cubic content. (N) State rate revision pending. (O) Ohio State Plan: Workmen's Compensation, The Industrial Commission of Ohio, Actuarial Section, Columbus, Ohio.

A Background of PERFORMANCE



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Compensation Insurance Rates for Construction

The accompanying table of base rates on compensation insurance for construction reports that "compensation must be insured in monopolistic state fund" in five states, Nevada, North Dakota, Ohio, West Virginia and Wyoming.

In four of these, the rate structures do not adapt themselves to the tabulation used for the other 44 states, so these are reported separately as follows:

NEVADA
Special Construction Schedule, Effective July 1, 1947
Rate Per $100 of Payroll

Type of Construction	Total**
Street or Road. All operations not under direct supervision of State Highway Dept. or municipal authorities (excl. tunnels and bridges over 50 ft.)	$4.80
Railroad. All operations incl. bridges under 50 ft.; excl. bridges over 50 ft. and tunnels	4.80
Tunnels. All work including lining	6.40
Tunnels, Shafts and Galleries exceeding 7 ft. in diam. All work to completion, incl. lining	8.00
Bridges. Wood, metal or concr. over 50 ft	6.40
Dam. Earth, rock or concr. All operations where height or length of structure exceeds 75 ft.; incl. excav., quarrying, jetty and breakwater constr. and pile driving, power plants and appurtenant wks., incl. gravel crushing plants. Pay roll to incl. employees engaged in making, setting up and taking down forms, scaffolds, false work and material distributing apparatus, shops, garages, railroad operations and other allied activities	6.40
Building. Brick, lumber or concr. not exceeding three stories, incl. carpentry, plastering, painting and electr. instal	4.00
Sewer. All operations (excl. tunneling except at street crossings)	4.00
Water Mains and Connections. (Excl. tunneling except at street crossings)	4.00
New Plant. Incl. install. of machy	6.40
Building. Moving or wrecking	6.40
Concr. Sidewalks, Curbs and Gutters. (N.P.D.†) Incl. sand and gravel pit operations and transportation of material (no blasting)	4.00
Excavation. For cellars, bldg. fdns, and other	4.00
Iron or Steel Erection	6.40
Steel Towers, Tanks, etc	6.40
Commissary. Cooks, waiters and other employees engaged in furnishing board for employees in connection with contracting risks	1.60
Timekeepers	1.60
Clerical. Strictly office employees. Not exposed to transportation or other general hazards of operations	.40

*** Distribution: Compensation, 62½%, accident benefits and occupational diseases, 37½%.*
† No payroll division.

Where an industry, establishment or work embraces activities separately classified under this Schedule of Rates, and where the employees of such industry, establishment or work are interchangeable, the premium rate applicable to such industry, establishment or work shall be the rate applied to that portion of the business that carries the highest general hazard rate, unless by request of the employer, or by action of the Commission, a general rate is established that will more nearly reflect the general hazard of that particular undertaking as a whole.

Should rates be desired on any undertaking not specified in the foregoing schedule, they will be quoted on request.

NORTH DAKOTA
Effective July 1, 1947
Rate per $100 Payroll

		Basic	Min. Prem.	*B.C.A. Factor
2803	Carpentry shop	$1.95	$8.85	$1,365
3060	Sheet metal fabr., install. and erect	1.35	7.05	945
3107	Blacksmithing	2.00	9.00	1,400
5025	Masonry work (N.O.C.†) (In sewers, see 6301)	2.25	9.75	1,575
5040	Bridges (over 25 ft.), erect. and paint. of struct. iron and steel, lightning rods, radio equip., windmills, iron work, balconies, fire escapes, railings, staircases and coal chutes outside of bldgs	14.50	46.50	10,150
5100	Erect. orn. brass, bronze, and iron work within bldgs.; mill wrighting, erect. and repair. machy.; install. of steam boilers, incl. constr. of neces. concr. or masonry fdns	2.50	10.50	1,750
5183	Plumbing, gas, steam, hot water and other pipe fitting, incl. house connections. Shop payroll, if any must be incl.	1.50	7.50	1,050
5190	Install. of elec. equip. in bldgs., exclusively, incl. broadcasting eng. and mechanics, install. and erect. within doors, and the making of service connections but excl. the erect. of dynamos and equip. in power plants	1.20	6.60	840
5205	Concr. constr. (excl. concr. bridges and culverts under 25 ft.). Payroll to incl. employees engaged in making, setting up and taking down forms, scaffolds, false work and operating concr. mixing or distrib. apparatus	4.50	16.50	3,150
5345	Plastering, the erect. of plaster boards, plaster block, and incl. stuccoing	3.00	12.00	2,100
5410	Carpentry	3.00	12.00	2,100
5462	Glaziers away from shop	3.50	13.50	2,450
5474	Painting and decorating (excl. paint. of steel struct. and bridges)	2.50	10.50	1,750
5502	Constr. of concr. floors, not reinf. or selfbearing, incl. tile floors, wainscoting and interior decorating	1.50	7.50	1,050
5545	Roofing (N.O.C.†)	8.00	27.00	5,600
5602	Alterations and repair of insured's exist'g bldgs. and plants, excl. erect. or demolition of struct. steel or the constr. of sewers, tunnels, shafts or subways. (This classification not applicable to contractors.)	1.50	7.50	1,050
5603	Consult. engrs. and archts., superv. only	.30	5.00	210
5700	Building, wrecking, raising and moving	18.00	57.00	12,600
6003	Pile driving	7.75	26.25	5,425
6042	‡Street and road constr. (no quarrying), incl. incidental culverts and single span bridges not over 25 ft., paving, street cleaning, sand and gravel excav	2.70	11.10	1,890
6200	Well drilling	5.00	18.00	3,500
6221	Excav., cellars and fdns. for bldg., retain. walls. Incl. grading prep. to bldg. erect. (No dredging)	3.50	13.50	2,450
6223	Dredging by floating dredges	7.50	25.50	5,250
6230	Dam construction. All employees	10.00	33.00	7,000
6251	Tunneling, inc. all work to completion	8.00	27.00	5,600
6253	Caisson work for bldgs. and bridge fdns. Payroll to incl. all employees working under air pressure	18.00	57.00	12,600
6301	Sewer building, no blasting or tunneling	10.00	33.00	7,000
6319	Laying of steam, water or gas mains and connections	3.75	14.25	2,625
6325	Conduit construction	2.75	11.25	1,925
6400	Constr. of fences of wood, stone, metal or concr. not over 6 ft. high	1.75	8.25	1,225
7534	Electric light and power line constr., incl. erect. of poles (N.P.D.§)	6.50	22.50	4,550
7535	Electr. apparatus-install. and repair, excl. erect. of poles and stringing of wires. N.P.D.§ with electric light and power companies	2.50	10.50	1,750
7590	Garbage works, reduction or incineration of garbage	2.00	9.00	1,400
9403	Garbage, refuse and ash collecting	2.00	9.00	1,400

** Basic Compensation Allowance. † Not otherwise classified. ‡ Rate named for this classification does not contemplate sawmill logging, timber cutting, etc. operations. § No payroll division.*

WEST VIRGINIA
Effective July 1, 1947
Rate per $100 of Total Gross Earnings of all Employees

Class		Base†	Class		Base†
B–4	Wood Working	$2.00	L–15	Bldg. Constr. and Repairs	$1.80
C–1	Clay, Sand and Gravel	3.20	L–22	Street and Road Constr	3.50
F–3	Municipalities	1.30	L–30	Plumbing	1.00
F–4	State and County Depts	1.00	L–47	Locks, Dams, Bridge Constr	4.00
F–5	State Road Comm	1.00	L–49	Trucking, Heavy Hauling	2.50
L–1	Tunneling and Excav	3.50	L–54	Steel Erection, N.O.C.*	4.00
L–4	Structural Steel Erect	10.00	P–7	Clerical Office Employees	.15
L–11	Electric Lines Constr	2.50	P–8	Salesmen and Engineers	.30

*† Loading, 10% of Base: Min., 50% of Base: Max., 200% of Base. New subscribers are charged base rate plus 15% loading, additional 5% being for catastrophe. * Not otherwise classified.*

WYOMING
Effective 1947

Provisions of the Workmen's Compensation Law Relating to Payment of Monthly Premiums include:

1. **Administration Fee**—Every employer who shall engage in any of the extra-hazardous occupations defined in the Workmen's Compensation Act, and who has not theretofore made any payment into the Industrial Accident Fund, shall pay an administration fee of ten dollars ($10.00) at the time of commencing employment to establish an account in the fund.

2. **Monthly Reports**—A signed statement of the total gross earnings (before Social Security or Withholding Tax or any other deductions) accrued to employees must be filed in the office of the State Treasurer on or before the 15th day of the month for the previous calendar month's payroll, by each employer coming under the provisions of the Workmen's Compensation Act. Names of all employees in extra-hazardous occupations as defined in the Act, must be shown on this report whether working any prrt of a day, week or month. (Do not include owners, co-owners, officers of a corporation or clerical workers.) When there are no employees a report must be filed bearing statement "NO EMPLOYEES." No premium payment is required when there are no employees, and should employment be terminated for an extended time or the business dissolved, a statement to that effect should be made with final payroll.

4. **Premium Rates**—Effective March 1, 1945, all employers coming under the Industriat Accident Fund for the first time pay a premium rate of five per cent (5%) on their first twelve (12) monthly premium payments; and providing an employer's account shows a credit balance following the first twelve (12) premium payments, his premium rate is reduced to one and one-quarter (1 1/4%) and continues at one and one-quarter per cent (1 1/4%) rate until such time as an overdraft occurs on the employer's account, or he becomes exempt through classification as related in paragraph five (5) below.

(4 A) The monthly premium rate of employers having established accounts on which twelve (12) premium payments have been made, and providing such accounts have a credit balance, is one and one-quarter per cent (1 1/4%) rate.

Overdraft Accounts must pay premium rates as follows:

Overdraft	Rate Applied
(4–B) 1% or less of the annual payroll	3%
(4–C) Over 1% not more than 2%	4%
(4–D) Over 2% not more than 3%	4½%
(4–E) Over 3% not more than 4%	5%
(4–F) Over 4%	5½%

(4 G) **Annual Payroll:** Multiply current monthly payroll by twelve (12).

5. **Exempt Classification**—Employers having credit balance to their accounts equal to full one and fifty hundredths per cent (1.5%) of annual payroll, such credit being not less than two thousand dollars ($2,000.00), are not required to pay any premium; **however, employers in this classification are required to file the usual payroll reports monthly.**

8. **Board and Lodging**—If board and lodging or similar advantages are furnished to a workman by the employer in lieu of or in addition to cash wages, the value thereof must be carried on the payroll at the rate of twenty dollars ($20.00) per month.

9. **Earnings Thru Commissions,** Piece Work, Overtime, Bonus or profit-Sharing Premiums, etc.—Workers paid commissions, by piece, foot, yard, ton or etc., are considered employees of the person or concern that employed them and supervises their work and should be shown on reports of such person or concern. Sub-contractors who contract to perform a specific service and hire their own workers must have accounts separate from account of general or prime contractor or other concern as they would be classified as employers rather than hired workers or employees.

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Construction Equipment Rental Rates

EQUIPMENT RENTAL RATES vary greatly throughout the United States, depending upon local practices and conditions. A schedule of prevailing rental rates, representing as nearly as could be determined an over-all average of rental rates throughout the United States for specific prices of equipment has been compiled for informational purposes only by the Rental Committee Associated Equipment Distributors, Chicago, Ill. Selected items from the fourth edition prepared in 1947 are reported below through the courtesy of the Associated Equipment Distributors.

Selected equipment rental rates

	Per Month	Per Week	Per Day
Air Compressors			
Portable, gasoline 105–160 cu. ft. 100 psi	$209	$70	$23.50
Portable, gasoline 160–210 cu. ft. 100 psi	285	95	32.00
Portable, diesel 160–210 cu. ft. 100 psi	334	112	37.50
Portable, diesel 425–500 cu. ft. 100 psi	678	226	75.50
Stationary, electric 160–215 cu. ft. 100 psi	168	56	19.00
Stationary, electric 470–570 cu. ft. 100 psi	311	104	35.00
Stationary, electric 900–1200 cu. ft., low pressure	402	134	45.00
Air Tools			
Clay spades, small	23	8	3.00
Drifters	72	24	8.00
Hoists to 1500-lb. single-drum	56	19	6.50
Hoists, 1500–2500 lb. double-drum	90	30	10.00
Hose, over ⅝ in. to 1 in., 50-ft. length	6 3/5	3 3/10	1.65
Paving breakers 70–90 lb	41	14	5.00
Rivet hammers	29	10	3.50
Vibrators, pneumatic powered, rigid type	67	23	8.00
Wagon drill (with air hoist)	181	61	20.50
Hammers, gasoline	84	28	9.50
Boilers			
Vertical 18–24 hp	85	29	10.00
Vertical 32–55 hp	110	37	12.50
Horizontal 55–70 hp	121	41	14.00
Horizontal 90–125 hp	196	66	22.00
Buckets			
Clamshell ¾ cu. yd	75	25	8.50
Clamshell ¾ cu. yd	103	35	12.00
Clamshell 1½ cu. yd	157	53	18.00
Concrete bottom-dump 1 cu. yd	42	14	5.00
Concrete bottom-dump 2 cu. yd	58	20	7.00
Dragline 1 cu. yd	97	33	11.00
Dragline 1½ cu. yd	120	40	13.50
Dragline 2 cu. yd	142	48	16.00
Orangepeel 1¼ cu. yd	195	65	22.00
Bulldozers—see tractors			
Concrete carts 6 cu. ft. rubber tired	14	5	1.75
Concrete carts 9–11 cu. ft. rubber tired	18	6	2.00
Cranes (capacity at ft. radius)			
Crawler gasoline 4½–7½ ton 12	523	175	59.00
Crawler gasoline 14½–19½ ton 12	782	261	87.00
Crawler gasoline 18½–26 ton 20	1,582	528	176.00
Crawler diesel 14½–19½ ton 12	918	306	102.00
Crawler diesel 18½–26 ton 20	1,907	636	212.00
Crawler diesel 14½–20 ton 45	3,117	1,039	346.50
Crawler steam 18½–24½ ton 12	803	268	89.50
Locomotive gas 27–32 ton 12	1,440	480	160.00
Locomotive steam 27–32 ton 12	1,361	454	151.50
Truck-mounted gas 7–9 ton 10	777	259	86.50
Truck-mounted gas 12–14½ ton 10	1,028	343	114.50
Crushers (without accessories or power)			
Openings 9x16	97	33	11.00
Openings 10x30	214	72	24.00
Openings 12x36	299	100	33.50
Derricks			
Stiff-leg wood 3½–4½ ton	111	37	12.50
Stiff-leg steel 4–6 ton 50–80 ft. boom	241	81	27.00
Stiff-leg steel 13–17 ton 70–100 ft. boom	434	145	48.50
Stiff-leg steel 32–42 ton 70–100 ft. boom	613	205	68.50
Guy 13–17 ton 70–110 ft. boom	274	92	31.00
Guy 35–45 ton 100–120 ft. boom	503	168	56.00
Engines			
Gasoline with clutch 22–30 hp	57	19	6.50
Gasoline with clutch 55–70 hp	105	35	12.00
Diesel with clutch 22–30 hp	84	28	9.50
Diesel with clutch 55–70 hp	153	51	17.00
Diesel with clutch 90–115 hp	278	93	31.00
Finegraders 11–16 ft. width (self-powered)	714	238	79.50
Finishing machines			
Concrete-floor (powered)	67	23	8.00
Road finishers 12–18 ft. roadway	490	164	55.00
Road finishers 24–30 ft. roadway	544	182	61.00
Bituminous machines	831	277	92.50
Graders			
Single drive—8,600 to 14,000 lb. gasoline	307	103	34.50
Tandem drive 19,000–21,000 lb. gasoline	519	173	58.00
Tandem drive 18,501–21,500 lb. diesel	583	195	65.00
Towed-power operated 9–11 ft.	208	70	23.50
Pile hammers			
Drop 1,500–2,250 lb.	22	8	3.00
McKiernan-Terry #2	67	23	8.00
McKiernan-Terry #7	157	53	18.00
McKiernan-Terry #10B2 or 3	$303	$101	$34.00
Vulcan #1	308	103	34.50
Vulcan #00	445	149	50.00
Vulcan Pile Extractor #1800	259	87	29.00
Tank Car Heater 2–3 car capacity	232	78	26.00
Hoists			
Gasoline single-drum 29–42 hp	109	37	12.50
Gasoline double-drum 22–28 hp	113	38	13.00
Gasoline double-drum 55–65 hp	195	65	22.00
Electric single-drum 17–27 hp	83	28	9.50
Electric double-drum 37–47 hp	155	52	17.50
Air 1,500–2,500 lb. double drum	90	30	10.00
Chain 1½–2½ ton	22	8	3.00
Chain 4–6½ ton	35	12	4.00
Mixers, Bituminous			
Central Plant 30–50 ton per hr. (gradation control)	1,731	577	192.50
Central Plant 70–90 ton per hr. (gradation control)	2,524	842	281.00
Traveling Plant 1¼–1¾ cy/min., self-propelling	1,196	399	133.00
Mixers, Concrete			
Power charger 6S to 8½S	94	32	11.00
Power charger 12S to 16S	179	60	20.00
Batch hopper 25S to 30S	243	81	27.00
Paver 27-E, 1- and 2-drum	1,023	341	114.00
Paver 34-E, single drum	1,747	583	194.50
Pumpcrete (concrete pump) gasoline			
Model 160 single cylinder (no remixer)	518	173	58.00
Model 200 double cylinder (with remixer)	1,249	417	139.00
Pumps			
Centrifugal, gasoline, 2 in. 7 to 10 M	45	15	5.00
Centrifugal, gasoline, 4 in. 30 to 40 M	89	30	10.00
Centrifugal, gasoline, 8 in. 125 M	222	74	25.00
Diaphragm force or open 3 in. double	56	19	6.50
Diaphragm force or open 4 in. double	68	23	8.00
Rollers			
Two-wheel tandem 5–9½ ton gasoline	280	94	31.50
Two-wheel tandem 12½–17½ ton gasoline	364	122	41.00
Three-wheel 5½–6½ ton gasoline	226	76	25.50
Three-wheel 7½–9 ton gasoline	302	101	34.00
Three-wheel 11–13 ton gasoline	469	157	52.50
Sheepsfoot, double drum	99	33	11.00
Sheepsfoot, triple drum	193	65	22.00
Shovels and back-hoes (dipper included)			
Crawler, gasoline ⅜ cu. yd	501	167	56.00
Crawler, gasoline ¾ cu. yd	715	239	80.00
Crawler, gasoline 1¼ cu. yd	997	333	111.00
Crawler, diesel ¾ cu. yd	818	273	91.00
Crawler, diesel 1¼ cu. yd	1,271	424	141.50
Crawler, diesel 2 cu. yd	2,179	727	242.50
Surveying instruments			
Levels	23	8	3.00
Transits	28	10	3.50
Tractor, crawler, and attachments			
33–41 hp. gasoline	295	99	33.00
66–85 hp. gasoline	473	158	53.00
46–52 hp. diesel	452	151	50.50
72–89 hp. diesel	713	238	79.50
89–135 hp. diesel	859	287	96.00
Winch, any size, double drum	85	29	10.00
Bulldozer 66–89 hp. tractor	135	45	15.00
Angledozer 66–89 hp. tractor	164	55	18.50
Tractors-wheeled			
4 wheel, rubber tired diesel 93–103 hp	588	196	65.50
4 wheel, rubber tired diesel 140–160 hp	942	314	105.00
2 wheel rubber tired diesel 145–160 hp	1,418	473	158.00
2 wheel rubber tired diesel 195–210 hp	1,842	614	205.00
Scrapers and Wagons (heaped measure)			
Scraper 7–10 cu. yd	278	93	31.00
Scraper 17–22 cu. yd	633	211	70.50
Scraper 29–37 cu. yd	1,134	378	126.00
Crawler wagons, bottom dump 9½–12½ cu. yd.	264	88	29.50
Crawler wagons, bottom dump 14½–20½ cu. yd.	410	137	46.00
Vibrators, gasoline, flexible shaft			
Up to 1½ hp. 28 ft. shafting	47	16	5.50
3½–4½ hp., 46 ft. shafting	80	27	9.00
Welding Machines, wheels or skids			
Gasoline-engine driven up to 250 amp	82	28	9.50
Gasoline-engine driven 350 to 500 amp	127	43	14.50
60 cycle motor driven up to 250 amp	40	14	5.00
60 cycle motor driven 350 to 500 amp	61	21	7.00

Index of Construction Machinery Prices

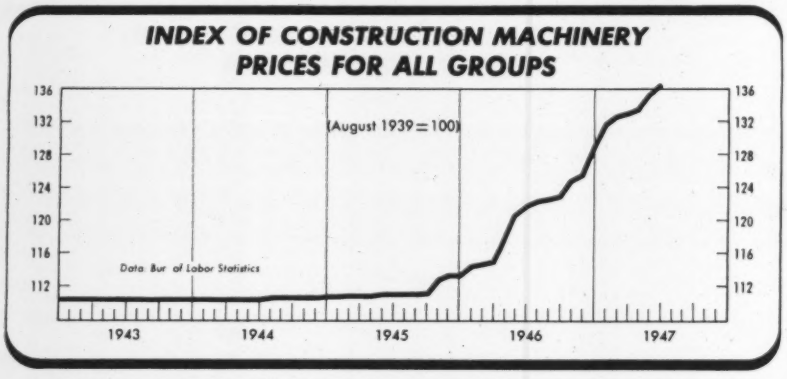


TABLE I.—INDEX OF PRICES OF CONSTRUCTION MACHINERY

August 1939—June 1947—Bureau of Labor Statistics
(August 1939 = 100)

	1939	1940	1941	1942	1943	1944	1945	1946	1947†
January	.....	100.6	103.2	110.5	110.5	110.5	110.7	114.2	131.6
February	.....	100.6	103.6	110.5	110.5	110.5	110.8	114.5	132.6
March	.....	100.6	104.2	110.5	110.5	110.5	110.8	114.7	132.9
April	.....	100.8	105.0	110.5	110.5	110.5	110.8	117.5	133.3
May	.....	100.9	105.5	110.5	110.5	110.5	110.9	120.3	135.2
June	.....	100.9	106.2	110.5	110.5	110.5	110.9	121.9	136.6
July	.....	101.3	106.5	110.5	110.5	110.6	110.9	122.2	.....
August	100.0	101.2	108.3	110.5	110.5	110.6	110.9	122.5	.....
September	100.0	101.4	109.3	110.5	110.5	110.6	111.0	122.8	.....
October	100.1	102.3	110.0	110.5	100.5	110.6	112.7	124.9	.....
November	100.4	102.3	110.4	110.5	110.5	110.6	113.3	125.6	.....
December	100.5	102.3	110.4	110.5	110.5	110.7	113.3	129.1	.....
Yearly Average	.....	101.3	107.0	110.5	110.5	110.6	111.2	120.8	.....

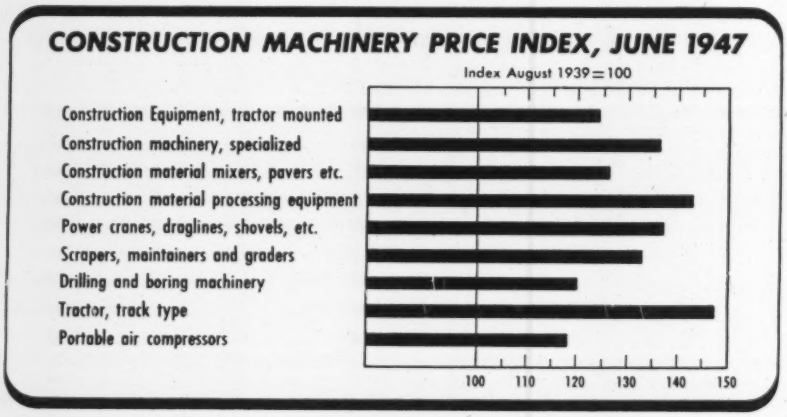


TABLE 2.—INDEX—BY GROUPS

	Aug. 1939	Dec. 1940	Oct. 1941	Dec. 1942	Dec. 1943	Dec. 1944	Dec. 1945	Dec. 1946	June 1947†
Constr. Equip., Tractor Mounted	100.0	100.3	108.8	108.8	108.8	109.7	100.5	120.2	123.9
Constr. Machinery, Specialized	100.0	101.1	110.8	111.5	111.8	111.8	113.6	132.4	136.2
Constr. Matl. Mixers, Pavers, Spreaders & Related Equip.	100.0	100.5	106.3	106.4	106.3	106.8	107.3	118.1	125.9
Constr. Matl. Processing Equip.	100.0	100.6	110.9	112.7	112.7	112.7	116.6	137.1	143.2
Power Cranes, Draglines, Shovels & Related Equip.	100.0	101.4	110.5	110.9	110.9	110.9	112.5	130.0	137.0
Scrapers, Maintainers, Graders	100.0	100.4	107.2	107.2	107.2	107.5	109.7	122.3	133.1
Drilling and Boring Machinery	100.0	100.0	100.0	100.0	100.0	100.0	100.0	112.0	120.1
Tractors, Track Type	100.0	106.0	113.4	114.4	114.4	114.4	120.1	138.0	147.4
Portable Air Compressors	100.0	100.7	100.0	98.4	97.9	97.9	97.6	111.9	118.4
Constr. Machinery—All Types	100.0	102.3	110.0	110.5	110.5	110.7	113.3	129.1	136.6

†Series discontinued after June, 1947.

Construction machinery prices rose 6 percent during the first half of 1947, to a new record high in June, continuing the rise which began in the last quarter of 1945. The index of the prices of construction machinery, as compiled by the Bureau of Labor Statistics on the basis of August, 1939 as 100, rose to 136.6 in June 1947 from 129.1 in December, 1946. Compared with the October 1945 index of 112.7, when the first significant rise occurred, the June 1947 index showed an increase of approximately 21 percent.

Information on construction machinery prices for the last half of 1947 is not available. The Bureau of Labor Statistics has discontinued its compilation of construction machinery price indexes after June, 1947.

The six months average index of 133.7 rose 11 percent above the 1946 average of 120.7 which was the highest annual average recorded since 1939. On a month to month basis, the 1947 index showed a steady increase with the largest gains made in the months of January, May and June, when the index rose 2.5, 1.9 and 1.4 points respectively.

Price rises from December 1946 to June 1947 in the various types of construction machinery ranged from 3 to 9 percent, the greatest gain made by scrapers, maintainers, graders.

The composite index for June 1947 rose 36.6 percent above the August, 1939 index. Four of the ten listed categories of construction machinery showed greater than average gains from the August, 1939 index. Track type tractors rose 47.4 percent; construction material processing equipment rose 43.2 percent; and power cranes, draglines, shovels, and related equipment rose 37.0 percent. Of the remaining six classifications, only one, portable air compressors, showed an increase of less than 20 percent over the August 1939 average. Specialized construction machinery rose 36.2 percent; scrapers, maintainers, graders, 33.1 percent; material mixers, pavers, spreaders, 25.9 percent; tractor mounted equipment, 23.9 percent; drilling and boring machinery, 20.1 percent.

Depreciation Schedule—U. S. Bureau of Internal Revenue

In January 1942 the U. S. Bureau of Internal Revenue revised its 1931 schedule of probable useful life and depreciation rates. Items of direct interest to civil engineers and contractors are shown in revised Schedule "F", and include those quoted in the following list. The schedule reveals the probable useful life in years. Annual depreciation rates are not given, inasmuch as they are considered to be on a straight-line basis. For example, on an item having a probable useful life of ten years, the annual depreciation rate is 10 percent; for an item having a probable useful life of 25 years, the annual depreciation rate is 4 percent, etc.

BUILDINGS	BUILDING ONLY Est. Total Life, Years	BUILDING & BLDG. EQUIPMENT Composite rate (percent) Type of construction Good	Average	Cheap
Apartments	50	2½	2½	3
Banks	67	2	2	2½
Dwellings	60	2½	2½	3
Factories	50	2½	2½	3
Farm buildings	60	2½	2½	3
Garages	60	2½	2½	2½
Grain elevators	75	2	2	3
Hotels	50	1½	2	2½
Loft buildings	67	2½	2½	3
Machine shops	60	2	2	3
Office buildings	67	2½	2½	3
Stores	67	2½	2½	3
Theaters	50	2½	2½	2½
Warehouses	75	1½	2	2½

BUILDING EQUIPMENT

	Years
Air conditioning:	
Air conditioning systems—	
Large—over 20 tons	20
Medium—5 to 15 tons	15
Small—under 5 tons	10
Air washer. (See Dehumidifier.)	
Compressors—	
Refrigerating	20
Air for pneumatic controls	20
Condensers—	
Shell and tube	20
Double pipe	20
Evaporation	15
Coolers, water—tank and coil or shell and tube	20
Dehumidifier	10
Drums, purge or surge	20
Ducts and other sheet metal work.*	
Fans	15
Filters, air, oil, self-cleaning	20
Dry cleanable	10
Gauges	15
Grilles and registers—	
Anemostats	20
Grilles and registers—	
Wall type	20
Ceiling	20
Window units	15
Placques	20
Santrols.*	
Heaters—	
Boiler, oil burner and tank	20
Booster heaters	20
Electric heaters	15
Finned tube heaters, steam water cleanable tube	20
Preheaters and reheaters	20
Water heaters, open or closed type	20
Insulation—	
Cork, cold pipes and tanks	20
Magnesia, hot pipes	15
Wool felt	20
Asbestos	15
Louvres and screens, fresh air—	
Copper	25
Steel	15
Manometers	15
Motors—	
Synchronous and exciter set	20
Induction, indoor	20
Induction, weatherproof for outdoor	20
Piping, refrigerant and other	20
Pumps—	
Chilled water	20
Condenser water	20
Condensate	20
Dehumidifiers	22
Evaporative condenser	15
Sump	25
Well	25
Receivers, refrigerant	25
Regulators, suction or static pressure	5
Silicia gel beds	15
Spray pond	15
Switchboard, electric panel	20
Thermometers, room type or recording	15
Tower, cooling	15
Valves—	
Relief	20
Automatic expansion and by-pass	5
Solenoid	15
Water regulating	20
Ammeters	15
Clocks	15
Clocks, watchman	15
Compressors, air and vacuum	20
Electric clock systems:	
Clocks, time	20
Conduits, fittings and wiring. (See lighting systems)	
Motors and generators	20
Switch equipment—	
Boxes.*	
Switch parts	20
Elevators:	
Freight	25
Passenger	20
Fire equipment:	
Fire alarm systems	25
Movable equipment	20
Sprinkler system.*	
Guards, machine	25
Heaters, electric	10
Heaters, gas	15
Heating systems:	
Boilers and furnaces	20
Burner equipment—	
Gas	16
Oil	10
Radiators	25
Lighting systems:	
Conduits and fittings.*	
Wiring	20
Fixtures	15
Miscellaneous facilities:	
Awnings	5
Doors, louvre, ventilating	15
Incinerators	14
Safes and vaults.*	
Screens, window	10
Shades	5
Venetian blinds	8
Plumbing:	
Faucets and flushing valves	15
Bath tubs, lavatories, toilet bowls, etc	25
Pipes—	
Brass or copper.*	
Iron, cold-water	25
Iron, hot-water or steam	20
Sewer, cast-iron or vitrified.*	
Plumbing: (cont'd)	Years
Valves—	
Brass body, water or steam.*	
Iron body, water or steam	20
Pumps:	
Suction, pressure and sump	13
Roofs:	
Asbestos	25
Asphalt and tar (prepared)	15
Galvanized iron—	
Light or cold dipped	15
Heavy or hot dipped	20
Tar and gravel (5-ply)	20
Tarred felt	10
Copper, slate, tile, tin.*	
Starters, electric	20
Switchboards, electric	25
Tanks and vats, water:	
Metal	25
Wood	15
Telephone equipment:	
Conduits and fitting.*	
Wiring and fixtures	20
Tools, small, miscellaneous	5
Transformers	25
Trucks, conveyance (within building)	10
Trucks, lift	15
Voltmeters	15
Welfare equipment:	
Athletic	10
Cafeteria	10
Hospital and first aid	10
Police and fire	10
Wells and well pumps	25

*Life of building.

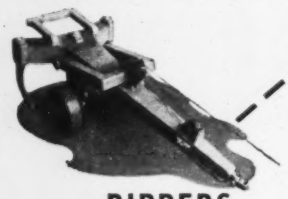
CONSTRUCTION EQUIPMENT

	Years
Automobiles:	
Light	2
Medium	3
Heavy	5
Backfillers, power:	
Light	3
Medium	5
Heavy	6
Tractor	5
Barges:	
Steel	30
Wood	25
Batcher plants:	
All steel, demountable	10
Steel frame, wood bin	10
Stationary	14
Wood frame and wood bin	7
Batch, measuring devices	4
Benders, bar	5
Bending blocks	10
Bending machines:	
Angle	15
Pipe	10
Rail	10
Bins:	
Steel, concrete	6
Steel	12
Wood	8
Bin frames, steel	6
Blacksmith shop outfits, portable	4
Blocks, pulley, differential	6
Blowers, mechanical	10
Boats:	
House	20
Motor	8
Boilers:	
Upright	7
Locomotive	15
Stationary	20
Borers (wood), portable	3
Boring apparatus, test	10
Boxes, mortar and batch	3
Brakes:	
Bending	10
Cornice (sheet metal)	22
Breakers, pavement, pneumatic	3
Buckets:	
Cableway	6
Clamshell	6
Concrete	5
Elevator	5
Orange peel	6
Bail, pivot turnover	5
Scraper or drag line	6
Buggies:	
Concrete	3
Timber	3
Building, job office or storage. (Life of job)	
Bulldozers:	
Gradebuilders	8
Tractor	4
Bunkers, stone portable, with screens	6
Burner equipment, gas and oil	12
Cables, wire	4
Cableways, cable only	3
Cableway carriage	5
Camping equipment	3
Capstans, electric	10
Cars:	
Ballast spreader	10
Batch box, steel	5
Boarding and tool	20
Concrete	8
Derrick, bridge	10
Dump, steel	8
Dump, wood	6
Flat, steel	12
Flat, wood	10
Hand	10
Hopper	10
Scale	10
Skip hoist	10
Tank	20
Carts, concrete	3
Carts, tool (steel)	4
Cement gun machines	4
Chains:	
Hawsers and lines	6
Power, transmission	5
Channelers, rock	6
Chipping and calking tools, pneumatic	3
Chutes, concrete, gravity	2
Clamps, column form	5
Cleaning machine for exterior of building, steam or sand	15
Compressors:	
Belt driven	10
Electric, portable	8
Gasoline, portable	6
Motor-truck unit	5
Steam portable	6
Concrete machines, pneumatic	5
Concrete mixers:	
Electric	5
Gasoline, 3½s, 5s, 7s	3
Gasoline, 10s, 14s	4
Gasoline, 21s, 28s	5
Paving, gas	8
Paving, steam	8
Steam	8
Truck mounted	5
Controllers, motor	12
Conveyors:	
Belt, elevating—	
Portable	3
Stationary	6
Bucket	6
Cable—	
Drag	6
Monorail	15
Chain, portable	6
Portable	5
Scraper	6
Cranes:	
Bridge and cantilever	20
Crawler—	
Electric—	
2½, 5 tons	5
10, 15 tons	7
20 tons and over	9
Gas—	
2½, 5 tons	5
10, 15 tons	9
20 tons and over	12
Locomotive gas	7
Steam—	
2½, 5 tons	6
10, 15 tons	10
20 tons and over	12
Locomotive	10
Dock or wharf, traveling	20
Dragline	10
Universal (gas, 2½ to 5 ton), mounted on 10-ton truck	6
Craneways:	
Steel	15
Wood	10
Crushers, rock:	
Portable	8
Stationary	10
Cutters:	
Bar, power	5
Corrugated iron, hand	10
Cutting and welding outfits, portable	4
Davits	15
Derricks:	
Boat	10
Circle swing, hand	8
Crab—	
Hand	16
Power	10
Guy—	
Steel	12
Wood	8
Stiffleg—	
Steel	12
Wood	8
Diggers, clay, pneumatic	3
Drag lines:	
Electric—	
¾, ⅞ cubic yard	6
1, 1½, and 1¾ cubic yards	8
2 cubic yards and over	10

The *Control* You Need to Keep Dirt on the Move!

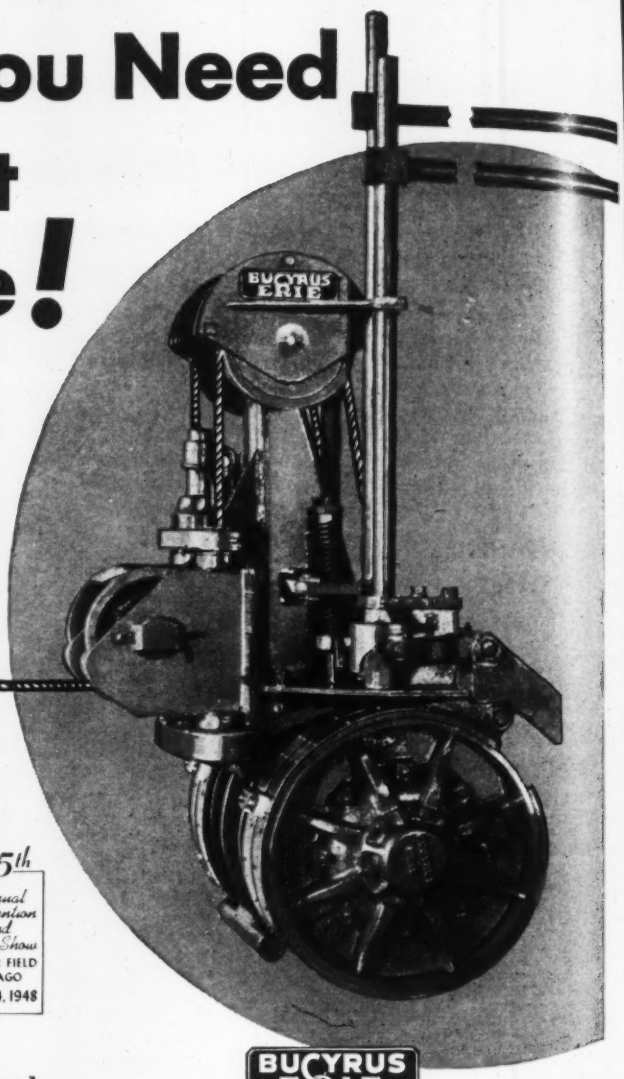
SCRAPERS

BLADE EQUIPMENT



RIPPERS

BETTER ROADS • FOR A BETTER WORLD • 45th Annual Convention and Road Show SOLDIER FIELD CHICAGO JULY 16-24, 1948



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Investigate the single and double drum, front and rear-mounted models offered for use with International crawlers. See your International Industrial Tractor Distributor.

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- SIMPLE PLANETARY DRIVE
- ADJUSTABLE LEVERS
- EXTERNAL BRAKE SURFACES
- INTERCHANGEABLE REVERSIBLE BANDS
- MOULDED BRAKE LININGS
- ANTI-FRICTION BEARINGS
- SINGLE BEARING ADJUSTMENT
- SINGLE BAND ADJUSTMENT
- SINGLE OIL BATH LUBRICATION
- TRANSPARENT OIL LEVEL SIGHT

1067480

Drag Lines: (*conf'd*)	Years
Gasoline—	
½, ¾ cubic yard	5
1, 1¼ and 1½ cubic yard	9
2 cubic yards and over	12
Steam—	
½, ¾ cubic yard	6
1, 1¼ and 1½ cubic yards	10
2 cubic yards and over	12
Dredges:	
Clamshell	16
Dipper	8
Hydraulic	20
Pipe	10
Drill boats	12
Drill points, well	5
Drills:	
Airdrifter	3
Electric or pneumatic, hand, for wood or metal	5
Hand, electric	3
Rock, electric	3
Jackhammer	3
Steam	5
Traction, well	7
Tripod	7
Tunnel carriage	5
Well	10
Drums for oil (steel)	10
Elevators:	
Bucket, stationary	6
Cage (steel tower)	5
Engines:	
Blowing	12
Fire	7
Gas	10
Marine	20
Oil	20
Plumbing	14
Steam	11
Excavators:	
Cableway, complete	4
Trench, gasoline—	
7-foot depth	6
12-foot depth	6
18-foot depth	8
Trench, steam—	
7-foot depth	8
12-foot depth	8
18-foot depth	10
Trench, vertical boom	5
Wheel or ladder type	5
Extinguishers, fire	3
Fans, exhaust	15
Finishing machines	4
Floats, bridge (steel)	5
Forges, gas or oil burning	10
Forms:	
Concrete (metal pans)	5
Concrete, supports, adjustable	4
Steel, for—	
Pavements	4
Pipes	3
Roads	4
Tunnels and conduits	4
Walls	5
Furnaces, metal melting:	
Coal fired	10
Electric	12
Gas or oil	7
Generator sets:	
Steam engine	12
Turbine, headlight or floodlight	4
Gin poles (steel)	10
Gradebuilders (bulldozers)	8
Graders:	
Blade, road—	
7, 8 foot blade	4
9, 10 foot blade	5
over 10-foot blade	8
Elevating	8
Form, subgrade planers	6
Rooters, wheel	5
Grinders:	
Metal surface	15
Saw filers and setters	14
Surface, concrete	4
Hammers:	
Electric	3
Pneumatic riveting	3
Harness	4
Heaters, asphalt, tar, and pitch kettles	4
Helmets, gas and diving suits and equipment	10
Hoists:	
Air, electric, or steam	8
Chain	6
Electric monorail or post	5
Gas	6
Hand power	8
Slew—	
Electric	8
Steam	12
Holders on pneumatic	4
Horses	5
Hose:	
Fire, linen or rubber lined cotton	5
Metal, flexible	10
Oil	5
Reel or cart	10
Rubber, air, steam or water	10
Inundators, batch	4
Inland craft:	
Graders, hydraulic	7
Quarter boats	10
Jacks:	
Hydraulic	8
Rail	25
Rachet	8
Screw	5
Steamboat, push and pull	3
Jibs, steam	17
Jointers, bench, electric, steam or gas	5
Ladders:	
Rope, wood rungs	2
Steel	3
Ladles, metal	7
Lathes:	
Metal working	15
Woodworking	17
Launches, gasoline	10
Levee construction equipment:	
Drag lines	8
Shovels	8
Tower excavators	12
Life-saving equipment	10
Light plant	4
Lighters	22
Loaders, bucket:	
Crawler	5
Portable	5
Stationary	6
Locomotive battery	4
Locomotives, industrial:	
Diesel	10
Electric	16
Gas—	
Up to 10 tons	8
10 to 20 tons	15
Over 20 tons	20
Steam—	
Up to 10 tons	8
10 to 20 tons	18
Over 20 tons	20
Locomotives, standard gage	30
Magnets, lifting	15
Milling machines	15
Mixers: portable mortar	3
Less than ½ cubic yard	6
Over ½ cubic yard	8
Caterpillar	8
Motors:	
AC and DC—	
Large	12
Medium	10
Small	8
Hydraulic	5
Pneumatic	5
Mowers, right of way	5
Mules	5
Pile drivers:	
Barge	8
Railroad outfits	10
Steam, on skids	10
Track	12
Pile hammers, steam or air:	
Heavy	10
Light	4
Medium	5
Pipe:	
Black or galvanized	4
Wood	5
Wood and steel combination	6
Pipe lines and fittings, for floating dredges	10
Pit and quarry plants	6
Planers:	
Metalworking	15
Woodworking	20
Plows:	
Furrow	3
Rooter	6
Pontoons	20
Presses, drill	12
Pumping units:	
Electric—	
Centrifugal	6
Diaphragm	6
Piston	6
Gas—	
Centrifugal	6
Diaphragm	6
Highway contractor's pump	4
Piston	5
Steam, centrifugal	10
Pumps:	
Air lift	10
Centrifugal	3
Humdinger	6
Impulse	6
Hydraulic	15
Oil	10
Steam piston unit	6
Testing for pipe lines	15
Punches, hydraulic	20
Punches for steel, power	15
Racks, storage, for pipe and steel:	
Steel	20
Wood	15
Rails, steel	10
Razing equipment, for buildings	8
Reamers:	
Electric	3
Pneumatic	3
Riveters, pneumatic	5
Rollers:	
Concrete finishing (steel)	10
Road, gas	10
Road, steam	10
Rolls, ridge	5
Rowboats	6
Sand-blast outfits	10
Sawmills, portable	10
Saws:	
Band, cut-off and rip, power	10
Hand, Electric and pneumatic	3
Saws and woodworkers:	
Steel frames	10
Wood frames	5
Scales, large, track and wagon	20
Scarifiers:	
Attachments	4
Blocks, steerable	5
Drag, all steel	4
Grader type	4
Scows	25
Scows, dump	25
Scrapers:	
Blade, carryall	6
Fresno or Morman	2
Rotary	4
Slip	2
Wheel	5
Screens and bunkers, for gravel pits only	5
Screens, revolving	6
Sharpeners, drill	8
Shears, for steel, hand	10
Shores, adjustable	4
Shovel attachments, for cranes	6
Shovels:	
Electric or gasoline, crawler or Wheel—	
½, ¾ cubic yard	5
1, 1¼, 1½ cubic yards	6
2 cubic yards and over	8
Steam, crawler or wheel—	
½, ¾ cubic yard	7
1, 1¼, 1½ cubic yard	8
2 cubic yards and over	10
Railroad, steam	10
Tunnel	4
Spouting plants, complete, concrete	4
Spraying equipment, paint	12
Spreaders, stone:	
Hopper wagon	5
Steel box	5
Steamers, paddle wheel	30
Switches:	
Portable	4
Stationary	5
Tampers, backfill, pneumatic	3
Tamping machines	10
Tanks:	
Gasoline, storage	6
Relay	6
Water or air, storage (steel)	10
Water storage (wood)	14
Tarpaulins and tents	3
Threading and cutting machines, pipe	10
Ties:	
Steel	12
Wood	6
Tongs, chain	4
Towers:	
Cableway—	
Steel	6
Wood	3
Steel boom with counterweights	5
Tracks, industrial, portable	6
Tractors:	
Electric—	
3-ton	3
5-ton	5
10-ton	6
20-ton	8
Gas or steam—	
3-ton	4
5-ton	6
10-ton	8
20-ton	10
Trailers:	
Dump—	
Steel	10
Wood	10
Platform, wood	4
Drop platform, heavy duty	5
Transformers, car	10
Trenching machines. (See Excavators.)	
Trucks, auto:	
General purpose or dump—	
½-1 cubic yard	3
1-1½ cubic yards	6
2 cubic yards and over	8
Tugs, screw-propelled, steam or gas	25
Turntables, industrial railway	4
Vises	5
Wagons:	
Dump—	
Steel	6
Wood	6
Farm—	
Heavy	10
Light	10
Road oilers, tank, steel	10
Tank or sprinkler—	
Steel	10
Wood	8
Washers, gravel	3
Welding outfits, acetylene or electric	10
Wheelbarrows	2
Winches, electric and pneumatic	10
Wire and cables:	
Electric	6
Flexible, steel armored	8

BRIDGES

	Years
Concrete and steel or masonry, large	100
Concrete and steel or masonry, small	75
Steel, heavy	50
Steel, light	40

WATER SUPPLY

	Years
Impounding dams	150
Springs and wells	100
Infiltration galleries and tunnels	100
Collection conduits and reservoirs	75
Mains, cast iron:	
4-inch and less	50
6-inch	65
8 to 10-inch	75
12-inch and over	100
Settling basins	50
Coagulating basins	50
Filters	50
Steam engines	30
Internal combustion engines (Diesel type)	25
Pumps	50
Stand pipes	50
Meters	30
Hydrants	50
General office equipment	19
General shop equipment	29
General store equipment	20
Laboratory equipment	10

ELECTRIC UTILITIES

Steam Production

	Years
Structures and improvements	50
Boiler plant equipment	28
Engines and engine driven generators	36
Turbo-generator units	30
Accessory electric equipment	28
Miscellaneous power plant equipment	28

Hydraulic Production

Structures and improvements	75
Reservoirs, dams and waterways	150
Waterwheels, turbines and generators	35
Accessory electric equipment	35
Miscellaneous power plant equipment	35
Roads, railroads and bridges	100

Transmission Plant

Structures and improvements	45
Station equipment	28
Towers and fixtures	50
Poles and fixtures	33
Overhead conductors and devices	50
Underground conduit	75
Underground conductors and devices	40
Roads and trails	60

Distribution Plant

Structures and improvements	45
Station equipment	28
Storage battery equipment	20
Poles, towers and fixtures	35
Overhead conductors and devices	33
Underground conduit	60
Underground conductors and devices	40
Line transformers	28
Services	28
Meters	28
Installations on customers' premises	25
Street lighting and signal systems	22

ARTIFICIAL GAS

Production Plant

	Years
Structures and improvements	50
Boiler plant equipment	30
Other power equipment	40
Benches and retorts	35
Coke ovens	35
Producer gas equipment	33
Water gas generating equipment	33
Petroleum gas equipment	33
Other gas generating equipment	33
Coal, coke, and ash handling equipment	40
Gas reforming equipment	33
Purification equipment	33
Residual refining equipment	40
Other production equipment	33

Distribution Plant

Structures and improvements	45
Mains	80
Cast iron pipe—	
4 inches and less	50
6 inches	65
8 to 10 inches	75
12 inches and over	100
Steel pipe—	
4 inches and less	30
5 to 7 inches	40
8 inches and over	50
Wrought iron pipe—	
¾ inches to 1½ inches	33
2 to 2½ inches	40
3 to 6 inches	50
8 to 10 inches	75
12 inch and over	100
Pumping and regulating equipment	35
Services	40
Meters	35
Meter installations	40
House regulators	40
House regulator installations	40
Other property on customers' premises	33
Other distribution system equipment	35

AVAILABLE NOW!

STRAN-STEEL FRAMING MEMBERS IN STOCK LENGTHS

HERE'S WHAT THEY ARE

Stran-Steel framing members are high-quality strip-steel, factory-punched for pipes, wiring and placing of screws. They may be joined by self-tapping screws or welding. No special architectural problems are imposed. The patented nailing groove of the joists and studs deforms and clinches nails in a grip of steel, so collateral materials can be nailed directly to the framing. Any structure, up to 2-½ stories, can be erected quickly and durably with ordinary carpenter tools.

ADVANTAGES

Rugged simplicity enables expansions and alterations to meet changing needs. Nailing grooves and openings for screws and equipment assure adaptability and low-cost construction. Steel insures greater stability, ruggedness and long life.

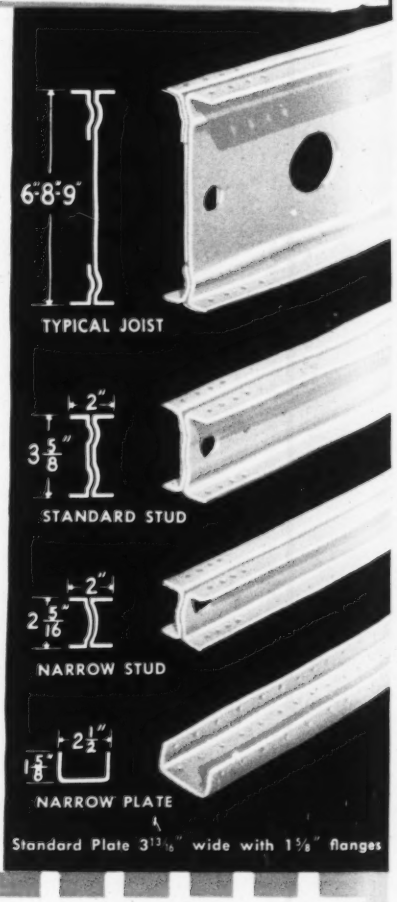
HERE'S WHERE TO USE THEM

Stran-Steel framing is proved superior for construction of interior partitions, tool cribs, shelving supports, railings, suspended ceilings, loading platforms, duct work framing and other miscellaneous jobs, as well as for industrial and commercial buildings.

You can save time in construction by stocking Stran-Steel framing members to meet your most likely requirements.

NOW'S THE TIME TO ORDER!

Attach the coupon below to your letterhead for prices on the items you need.



YOU NAIL TO STRAN STEEL FRAMING

GREAT LAKES STEEL CORPORATION

STRAN-STEEL DIVISION • UNIT OF NATIONAL STEEL CORPORATION

Manufacturers of the famous Quonset Buildings

GREAT LAKES STEEL CORPORATION
Stran-Steel Division, Dept. 39
Penobscot Bldg.
Detroit 26, Michigan

Please quote prices on the following, for immediate delivery.

Quantity	Gauge	Item	Length
	16	2 x 6 JOISTS	14′
	"	"	16′
	"	"	18′
	"	"	20′
	"	"	22′
	"	"	24′
	"	"	26′
	"	"	28′
	"	"	30′
	16 14	2 x 8 JOISTS	14′
	"	"	16′
	"	"	18′
	"	"	20′
	"	"	22′
	"	"	24′
	"	"	26′
	"	"	28′
	"	"	30′
	"	2 x 9 JOISTS	14′
	"	"	16′
	"	"	18′
	"	"	20′
	"	"	22′
	"	"	24′
	"	"	26′
	"	"	28′
	"	"	30′
	18	2¼" STUDS	20′-0″
	16	2⅛" STUDS	8′-0″
	"	"	8′-4″
	"	"	10′-0″
	"	"	12′-6″
	"	"	20′-2″
	"	"	25′-0½″
	"	"	30′-0″
	"	3⅛" STUDS	8′-0″
	"	"	8′-4″
	"	"	10′-0″
	"	"	12′-6″
	"	"	20′-0″
	"	"	25′-0½″
	"	"	30′-0″
	"	3¾" CHAN'L PLATE	22′-0″
	"	2½" "	22′-0″

Note: Stran-Steel framing is available in special lengths, if the identical item is ordered in quantities of 11,000 lineal feet or more.

Index of Small House Costs

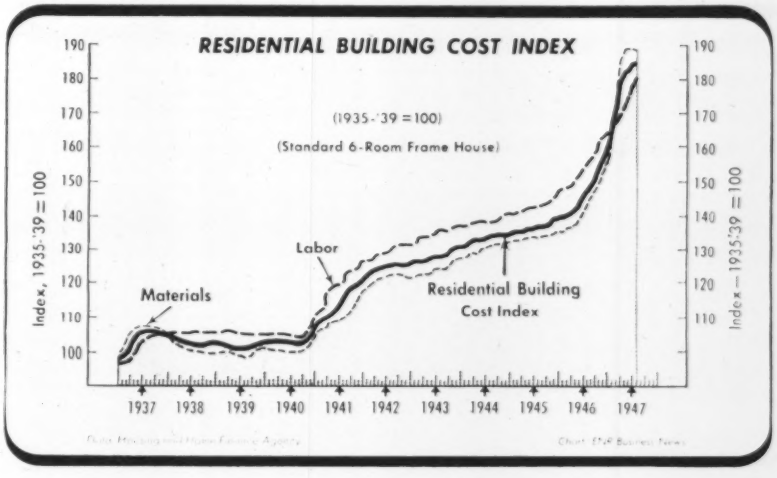
The index for measuring price variations of a moderate priced single-family dwelling is based by the Housing and Home Finance Agency, upon a limited bill of specifications which reflects price changes of the more important building materials. The quantity and quality of the building materials and the number of work hours required of the various crafts to construct a six-room frame house is taken into consideration.

Although this hypothetical house is standard in the index, it is not typical in the sense of being a strict average of all the houses under construction at the time. Rather, it is a frame dwelling characteristic of the modest residential districts of many American cities. The dwelling specifies high quality materials but no extravagances and would sell in 1935 or 1936 in the vicinity of $5,500 excluding land and items of equipment which are not considered part of a general contract estimate.

The house is a detached home of 24,000 cu. ft. volume, of good design, containing a living room, lavatory, dining room and kitchen on first floor, and three bedrooms and bath on second floor. An open attic may be used for storage or may be finished into one or two usable rooms. The cellar or basement is without partitions and contains heating plant and laundry facilities. Exterior treatment is assumed to be a combination of wideboard siding, with brick and stucco. A one-car attached garage is included. The plot is assumed to be approximately level with no unusual soil conditions. Materials, finish and workmanship specified are standard and typical of the practices of reputable small-house builders. Structural design meets all reasonable requirements of a municipal building code. Care was exercised to avoid all unusual practices.

The cost of small houses, as measured by the index based on 1935-1939 as 100, averaged 179.6 for the first seven months of 1947, a rise of 22 percent over the 1946 annual average of 147.8. Information on the cost of small houses for the latter part of 1947 is not available. Compilation of the indexes of building costs for a standard six-room frame house was discontinued after July 1947.

The combined index on July 1947 of 185.1 was 15 percent above the December 1946 index of 160.8. The material cost index rose from 158.9 in December, 1946 to 188.5 in July 1947, or 19 percent. The labor cost index of 181.0 showed an increase of 10 percent over the December 1946 index of 164.8.



Indexes of Building Costs for Standard 6-Room Frame House. Housing and Home Finance Agency.

(1935-1939 = 100)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver.
Combined Index													
1935											95.1	95.0	95.1
1936	95.1	95.1	95.2	95.5	95.9	96.1	96.5	96.8	97.0	97.3	97.8	98.7	96.4
1937	99.9	101.1	102.9	104.3	105.2	105.8	106.2	106.3	106.2	105.9	105.5	104.8	104.5
1938	104.2	103.7	103.3	103.0	102.7	102.6	102.5	102.1	102.0	101.7	101.7	101.6	102.6
1939	101.5	101.5	101.6	101.4	101.2	101.1	101.0	100.9	101.3	101.8	102.3	102.3	101.5
1940	102.2	102.3	102.2	102.1	102.1	102.1	102.1	102.3	102.9	104.7	106.1	107.6	103.2
1941	108.4	109.2	109.7	110.2	110.7	111.8	112.8	114.3	115.7	117.6	118.2	118.8	113.1
1942	119.5	120.4	121.3	121.6	122.0	122.6	123.0	123.4	123.3	123.5	123.6	124.3	122.4
1943	124.4	124.9	125.1	125.5	126.0	126.3	126.7	127.3	127.8	129.1	130.1	131.0	127.0
1944	131.7	132.1	132.6	133.2	133.7	134.1	134.3	134.7	135.0	135.3	135.9	136.0	134.1
1945	136.1	136.3	136.7	136.8	136.9	137.0	137.2	137.4	138.0	138.5	139.1	139.3	137.4
1946	139.7	140.3	141.0	142.1	143.6	145.7	147.7	149.8	151.9	154.2	156.9	160.8	147.8
1947†	168.0	173.8	179.6	182.5	183.7	184.8	185.1						
Material Index													
1935											95.9	95.8	95.8
1936	95.9	96.1	96.2	96.3	96.5	96.7	97.0	97.4	97.5	97.8	98.3	99.5	97.1
1937	101.0	102.6	104.6	106.0	106.7	107.0	107.2	107.3	107.0	106.5	105.9	105.0	105.6
1938	104.1	103.4	102.6	102.1	101.7	101.5	101.2	100.5	100.4	100.3	100.2	100.0	101.5
1939	99.9	99.9	99.9	99.8	99.6	99.5	99.4	99.3	99.9	100.5	101.3	101.4	100.0
1940	101.3	101.3	101.3	101.1	101.2	101.2	101.1	101.3	101.9	103.3	104.5	105.7	102.1
1941	106.4	107.2	107.9	108.2	108.4	109.0	110.2	112.1	113.8	115.7	116.3	117.1	111.0
1942	118.0	119.0	119.7	120.1	120.4	120.5	120.7	120.8	121.1	121.2	121.4	121.4	120.4
1943	121.3	121.5	121.7	121.9	122.4	122.6	123.1	123.8	124.5	126.1	127.2	128.1	123.7
1944	128.8	129.4	129.8	130.4	130.9	131.4	131.6	132.1	132.2	132.2	132.4	132.5	131.2
1945	132.5	132.8	133.1	133.2	133.4	133.5	133.8	133.9	134.1	134.6	135.0	135.2	133.8
1946	135.5	136.3	137.1	138.0	139.2	141.6	143.7	146.1	148.3	150.5	153.8	158.9	144.1
1947†	168.5	177.6	185.6	188.8	189.1	189.0	188.5						
Labor Index													
1935											93.5	93.4	93.4
1936	93.4	93.2	93.3	93.9	94.6	95.0	95.4	95.5	95.9	96.3	96.9	97.2	95.0
1937	97.6	98.2	99.4	101.1	102.2	103.5	104.2	104.5	104.6	104.7	104.8	104.5	102.4
1938	104.3	104.2	104.6	104.7	104.6	104.8	105.0	105.3	105.1	104.7	104.6	104.8	104.7
1939	104.7	104.8	104.9	104.5	104.3	104.2	104.2	104.1	104.3	104.5	104.2	104.2	104.4
1940	104.0	104.2	104.2	103.9	104.0	103.9	104.0	104.3	104.7	107.3	109.2	111.5	105.1
1941	112.6	113.2	113.3	114.2	115.3	117.3	117.9	118.8	119.5	121.6	121.9	122.2	117.3
1942	122.7	123.2	124.4	124.7	125.1	126.7	127.8	128.6	129.3	129.5	129.5	130.0	126.8
1943	130.5	131.8	132.0	132.8	133.4	133.7	133.0	134.1	134.3	135.3	135.7	136.9	133.7
1944	137.3	137.6	138.2	138.9	139.2	139.4	139.8	139.9	140.8	141.4	142.8	143.0	139.9
1945	143.3	143.4	143.8	143.9	143.9	143.9	144.1	144.5	146.0	146.3	147.3	147.5	144.8
1946	147.9	148.5	148.9	150.6	152.5	153.8	155.6	157.2	159.3	161.6	163.1	164.8	155.3
1947†	166.8	168.6	170.2	172.4	175.5	179.2	181.0						

† Note. Series discontinued after July 1947.

FOR CONSTANT FULL FLOWING AND LIFELONG SERVICE!

● Copper Service Pipe connected with STREAMLINE SOLDER FITTINGS has been installed in hundreds of communities throughout the United States and Canada, from corporation to curb stop and on into the building. It has been providing peak service for many years and will for many years to come. STREAMLINE Copper Pipe and Solder Fittings combine the non-corrosive qualities of copper and bronze with the most modern and reliable method of water service installation on the market.

Rustable piping, which has been in service for a number of years, may outwardly still appear to be in fair condition, but it is almost a certainty that the walls of the pipe, in many places, have been so reduced by corrosion, that it is only a matter of time until failure occurs. More than that, the conducting area of the pipe has, in the great majority of cases, been greatly reduced by the accumulation of slime and corrosion.

An installation of STREAMLINE Copper Pipe and Fittings insures a constant full-flow of water from main to building. With the possible exception of abnormal earth or water conditions, it will last for generations.

Many municipalities throughout the country are now making plans for improvements or additions in their water systems as soon as Copper Pipe is again available. STREAMLINE Copper Service Pipe is the ideal material for water service lines and for many applications in filtration plants; in aeration lines and in heating coils using the sludge digestion system in sewage disposal plants—and, of course, for all general heating and piping purposes.

STREAMLINE
PIPE AND FITTINGS DIVISION
MUELLER BRASS CO.
PORT HURON, MICHIGAN

STREAMLINE

TRADE MARK REG. U. S. PAT. OFFICE

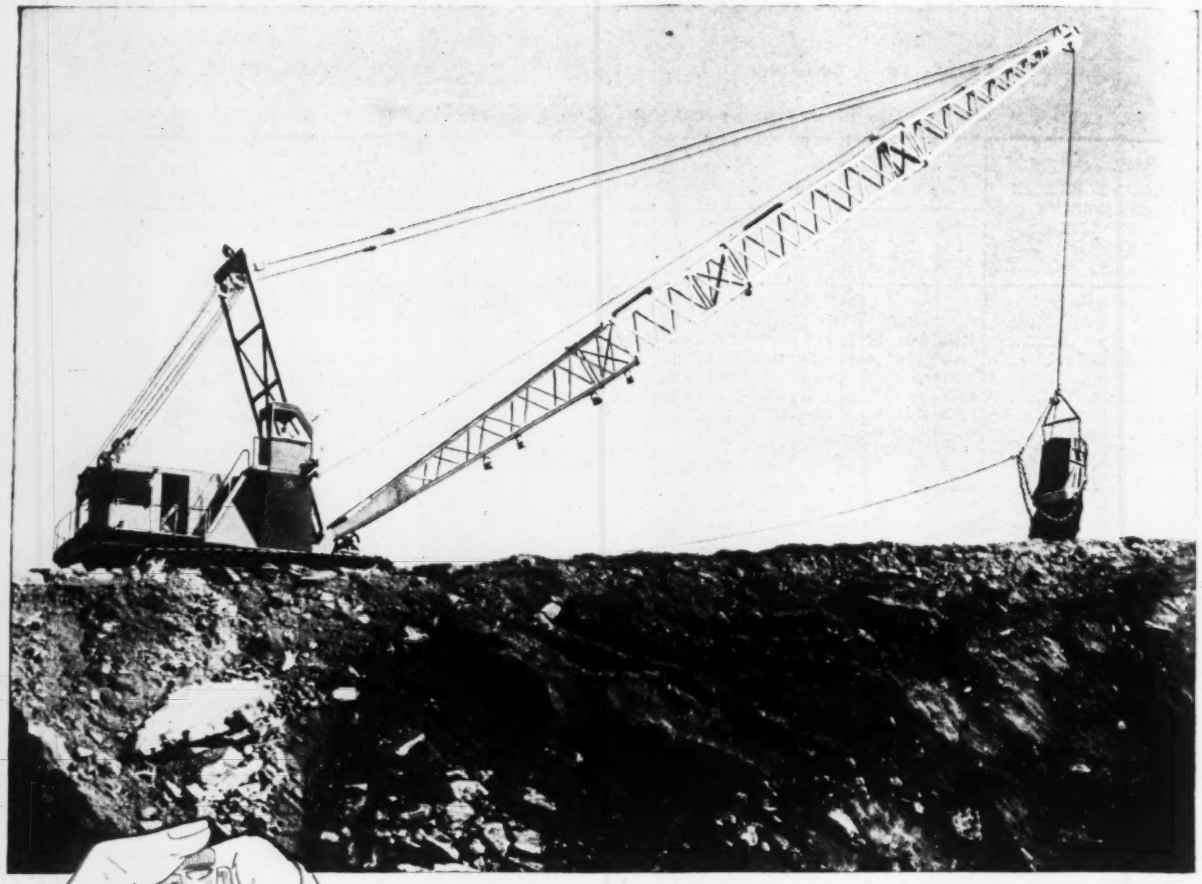
COPPER PIPE AND FITTINGS

Cost Index for Standard House in 47 Cities — 1935-1939 = 100

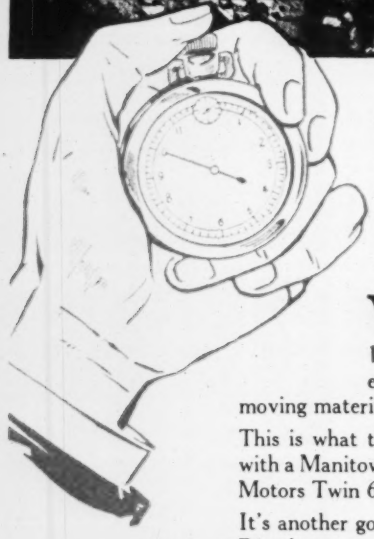
Housing and Home Finance Agency

FEDERAL HOME LOAN BANK DISTRICT AND CITY	1939				1944				1945				1946				1947		
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III
BOSTON: *																			
Hartford, Conn.	100.5	100.1	100.0	101.1	134.6	135.1	135.2	136.5	136.8	136.8	137.3	137.9	137.5	144.1	147.4	156.2	169.7	169.7	
Portland, Maine	99.0	99.6	98.8	98.6	146.7	148.2	151.4	152.4	152.5	152.5	152.5	153.5	153.8	164.8	169.9	179.2	197.9	197.3	
Boston, Mass.	102.3	100.9	101.7	103.1	130.5	132.8	133.2	133.2	133.4	133.6	133.6	134.2	137.9	140.8	147.1	157.5	179.1	179.8	
Manchester, N. H.	100.2	98.8	97.6	97.9	118.1	120.0	124.2	124.4	127.1	127.1	127.1	128.0	129.5	132.9	136.9	139.8	165.5	165.2	
Providence, R. I.	103.0	104.0	103.2	104.2	136.2	138.6	139.7	141.4	141.8	142.4	142.7	146.0	147.6	157.4	159.4	165.4	187.8	197.6	
NEW YORK: †																			
Camden, N. J.	101.9	103.7	101.8	106.5	138.8	140.7	143.6		143.2	145.2	145.2		158.6						
Newark, N. J.	103.5	103.4	102.6	105.6	154.5	157.1	159.3		159.7	161.9	161.9		171.4						
Albany, N. Y.	99.5	101.6	100.4	101.9	140.6	140.4	143.8		148.0	151.4	151.6	157.4	159.7	161.1					
Buffalo, N. Y.	102.0	100.2	99.2	104.7	135.8	140.0	142.1	144.6	144.6	149.4	147.1	149.2	149.6	151.6	166.0	175.4	182.6	196.3	202.8
PITTSBURGH: #																			
Wilmington, Del.	103.7	100.7	97.5	97.0	133.4	134.2	134.9	134.9	134.9	136.2	137.0	137.9	138.5	141.6	143.1	154.9	180.1	188.6	189.0
Philadelphia, Pa.	102.0	102.6	103.8	105.6	148.5	150.0	149.7	151.1	151.4	151.9	158.3	161.1	170.0	172.9	176.5	187.4	199.9	207.2	213.3
Pittsburgh, Pa.	105.0	104.3	104.7	104.1	133.5	134.0	134.2	134.6	134.6	134.7	135.0	136.6	139.6	140.9	146.9	152.7	177.0	184.6	184.1
Charleston, W. Va.	102.0	101.6	100.9	101.6	121.6	132.3	133.4	134.2	134.2	134.1	135.4	136.1	136.3	150.5	157.4	166.0	194.3	203.3	196.8
WINSTON-SALEM: *																			
Birmingham, Ala.	100.9	98.1	97.1	99.2	126.0	126.5	128.4	128.5	128.5	127.4	127.4	127.6	132.0	135.6	139.9	154.7	164.5	170.5	
Washington, D. C.	105.8	102.9	104.4	104.4	139.1	141.4	142.8	143.3	144.4	144.5	144.5	150.4	153.1	159.2	169.7	174.6	198.0	207.6	
Atlanta, Ga.	96.5	95.5	94.9	97.5	140.3	142.5	143.8	146.4	145.8	145.7	148.3	151.7	153.5	158.0	160.8	180.8	198.6	205.1	
Baltimore, Md.	101.4	100.8	100.0	102.1	147.2	148.8	148.8	150.1	150.2	150.5	152.7	155.8	156.8	162.7	179.6	191.7	209.3	207.8	
Richmond, Va.	100.9	98.0	98.9	98.4	127.3	130.2	130.2	133.1	133.5	133.5	133.8	135.9	136.7	145.8	151.8	160.3	172.0	177.0	
CINCINNATI: #																			
Louisville, Ky.	100.8	101.0	100.7	104.0	126.5	133.7	134.3	134.7	135.2	136.3	135.7	138.4	142.9	146.0	148.9	152.1	177.4	192.0	188.8
Cincinnati, Ohio.	96.3	96.6	96.3	97.4	131.2	133.9		134.6	137.7	138.2	138.3	138.2	140.1	141.0	146.1	152.2	170.3	173.4	177.9
Cleveland, Ohio.	101.1	101.9	102.1	107.6	139.5	142.6	142.6	147.8	147.9	147.5	148.1	149.2	145.9	147.0	159.6	163.1	171.6	191.6	196.2
Memphis, Tenn.	104.7	102.5	101.2	104.0	134.4	134.4	135.3	135.6	136.0	136.9	137.7	139.9	141.3	141.6	147.3	154.1	172.6	184.1	181.6
INDIANAPOLIS: †																			
Indianapolis, Ind.	102.7	105.2	105.2	101.2	133.9	134.2	136.6	137.3	138.1	139.5	140.5	141.6	141.7	142.7	146.5	148.2	162.0	177.6	179.9
Detroit, Mich.	108.3	107.2	107.2	104.0	147.7	149.6	152.6	152.1	152.3	152.9	153.6	153.4	156.3	160.7	162.7	171.2	191.1	197.2	199.0
CHICAGO:*																			
Chicago, Ill.	100.0	100.3	99.1	99.4	112.3	112.0	112.0	112.4	112.4	112.6	115.3	117.2	121.8	124.8	130.2	134.9	148.8	150.6	
Milwaukee, Wis.	106.7	107.0	106.2	107.9	141.3	142.3	142.1	142.4	142.3	144.4	145.8	146.9	148.1	155.1	159.6	166.0	192.0	195.1	
DES MOINES: †																			
Des Moines, Iowa	101.6	101.6	101.8	102.0	118.3	118.4	121.1	120.9	120.7	120.8	120.8	121.4	121.5	122.7	124.9	140.4	151.7	161.1	164.3
St. Louis, Mo.	98.5	98.0	96.4	98.0	119.2	123.1	122.7	124.4	126.4	126.9	132.9	149.5	150.3	148.8	161.8	164.9	177.5	184.3	184.8
Fargo, N. D.	99.1	99.0	98.1	102.3	123.9	124.7	125.1	125.7	126.7	128.3	127.8	128.1	128.1	129.5	134.4	137.8	148.2	177.8	185.1
Sioux Falls, S. D.	105.1	104.0	100.8	101.4	127.7	127.7	130.4	130.8	130.8	131.9	133.0	133.1	133.8	135.9	143.8	148.7	160.3	188.3	188.0
LITTLE ROCK: #																			
Little Rock, Ark.	101.6	102.1	102.7	103.2	135.4	137.6	138.1	138.5	138.4	139.0	138.8	140.9	142.3	145.4	154.9	163.1	185.4	186.3	186.4
New Orleans, La.	102.2	101.2	101.4	105.3	141.3	141.2	141.2	141.7	141.9	141.9	141.9	142.7	143.1	150.2	155.2	160.5	201.2	204.0	223.0
Jackson, Miss.	105.1	103.3	103.0	105.1	132.3	136.8	137.2	137.2	137.2	139.0	139.2	141.1	141.6	141.7	148.6	156.8	187.1	191.9	195.3
Albuquerque, N. M.	103.0	103.5	103.5	104.8	133.8	133.9	130.9	132.0	134.7	132.0	132.3	132.5	133.9	137.6	148.6	152.2	162.8	167.7	170.5
Houston, Texas	100.6	100.7	100.2	99.9	123.1	123.6	126.7	126.8	126.4	126.8	126.8	128.6	132.3	135.5	138.1	146.5	167.8	185.4	184.5
TOPEKA: *																			
Denver, Colo.	101.0	101.4	99.8	98.9	120.1	122.5	122.8	125.3	128.0	128.2	127.3	129.1	132.1	136.5	141.8	147.0	167.3	177.7	
Wichita, Kan.	109.1	108.0	107.7	103.9	133.2	134.4	135.7	135.9	135.9	136.7	136.8	137.3	138.1	140.2	144.1	151.6	192.5	196.3	
Omaha, Neb.	100.4	100.3	103.1	105.5	131.2	133.3	134.0	134.5	136.3	137.3	137.3	139.9	140.5	142.4	152.3	155.6	179.8	186.8	
Oklahoma City, Okla.	104.7	104.3	104.9	106.8	148.2	149.4	149.4	151.3	151.3	151.4	151.5	153.3	162.3	165.2	175.1	180.4	206.7	207.0	
PORTLAND: †																			
Boise, Idaho	103.8	104.6	103.4	103.8	133.1	136.8	137.1	139.1	138.1	138.1	138.9	138.9	138.9	138.9	141.2	143.8	147.1	169.7	169.4
Portland, Ore.	98.6	95.8	95.4	97.0	138.5	140.9	140.9	143.6	143.4	143.4	141.5	142.4	142.5	151.5	159.7	160.9	173.4	195.9	194.6
Salt Lake City, Utah.	100.5	103.0	102.8	102.5	123.3	126.8	126.8	129.7	129.7	129.1	129.5	130.4	130.5	132.0	138.2	141.5	150.9	160.7	168.5
Seattle, Wash.	102.2	102.7	101.9	102.8	131.9	133.7	134.6	138.9	138.9	138.9	139.6	135.3	135.7	137.9	142.9	147.5	156.5	184.4	206.9
LOS ANGELES: †																			
Phoenix, Ariz.	98.3	96.5	97.9	99.4	118.5	118.0	122.0	122.0	122.3	122.4	122.3	121.9	121.9	122.9	124.8	128.9	138.8	166.7	158.1
Los Angeles, Calif.	98.2	96.0	95.0	96.3	146.5	148.2	148.9	151.3	150.9	151.4	151.9	153.7	153.7	161.4	169.3	173.0	188.9	197.8	201.6
San Francisco, Calif.	103.8	103.1	102.5	102.3	128.4	134.5	134.5	135.8	135.1	136.3	136.1	136.5	138.4	141.1	147.0	151.4	166.9	180.4	179.4
Reno, Nevada	102.3	102.1	102.3	104.3	124.6	127.5	133.0	132.9	133.0	133.0	133.1	133.5	130.8	133.9	143.0	150.7	154.3	172.1	172.5

* Boston, Winston-Salem, Chicago, Topeka reporting dates: March, June, September, December. † New York, Indianapolis, Des Moines, Portland, Los Angeles reporting dates: January, April, July, October. # Pittsburgh, Cincinnati, Little Rock reporting dates: February, May, August, November.



Manitowoc crane and dragline owned by the Coal Rain Coal Co., Junedale, Penna., and powered with a General Motors Series 71 "Twin" Diesel engine.



A pass every 50 seconds

WHEN you drag a four-yard bucket from the end of a 140-foot boom and make a pass every 50 seconds, you're really moving material.

This is what the Coal Rain Coal Co. is doing with a Manitowoc crane powered with a General Motors Twin 6 Diesel engine.

It's another good example of what GM 2-cycle Diesel power can do. With power at every down-stroke, pick-up is fast, response is rapid, and there's unusual power for a Diesel so compact, so reasonable in size and weight.

GM "71" Diesels are setting performance records in all kinds of equipment. They step up production, cut down maintenance and lower fuel costs.

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GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

Contract Unit Bid Prices

Selected list of 53 projects showing how contractors bid in 1947-1948

INDEX TO PROJECTS COVERED—BY TYPE

WATERWORKS

Project	Page
Watermain, Milwaukee, Wisconsin	175
Water Pipe Lines, Delaware, Ohio	177
Water Storage Tank, Bismarck, North Dakota	177
Watermain, Jefferson, Georgia	179
Well Pump Station, Newtown, Connecticut	179

SEWERAGE

Project	Page
Sanitary Sewers, Fresno, California	179
Interceptor Sewer, Dallas, Texas	181
Lamberts Point Sewage Treatment Plant, Virginia	181
Relaying Combined Sewers, Milwaukee, Wisconsin	183
Sanitary Sewer and Water Main Extensions, McKenzie, Tennessee	183
Stormwater Channel, E. St. Louis, Missouri	183
Sewer Extension, Idlewild, New York	184
Sewerage and Waterworks Additions, Hamburg, Pennsylvania	185

AIRPORTS

Project	Page
Taxiway at Logan Airport, Boston, Massachusetts	185
Baltimore Airport Runways, Maryland	185
Improvements at Toledo Municipal Airport, Ohio	187
Airport Improvements, Georgia	187
Paving at International Airport, Baltimore, Maryland	189

STREETS AND HIGHWAYS

Project	Page
Elevated Highway, Washington, D. C.	189
Macadam Surfaced Road, Pennsylvania	190
Highway, Worthington, Minnesota	190
Highway Improvement, New Hampshire	193
Gravel Base Road, West Memphis, Arkansas	193
Reinforced Concrete Road, Lawrence County, Indiana	193
Cement Concrete Pavement, Baton Rouge, Louisiana	195
Bituminous Surfaced Road, Statesboro, Georgia	197
Surfacing State Highway, California	197
Highway Improvement, Utah	199
Van Wyck Expressway, Queens, New York	199
Highway Improvements, White Pine County, Nevada	201
Highway and Culvert, Grundy County, Missouri	201

BRIDGES

Project	Page
Concrete Pavement and Bridge Over Angelico Creek, Virginia	203
Reinforced Concrete Bridge, Los Angeles, California	203
Connecticut River Bridge	203
Little Red River Bridges, Arkansas	204
Road Bridge and Approaches, Georgia	204
Mystic River Bridge Piers, Massachusetts	207
Racine Street Bridge, Janesville, Wisconsin	207
Highway and Railroad Bridges, Newark, New Jersey	207

EARTHWORK

Project	Page
Big Thompson Project, Colorado	208
Bank Protection along Red River, Shreveport, Louisiana	211
Tully Dam, Royalston, Massachusetts	211
Locks No. 27, Chain of Rocks Canal, Mississippi River	211
Big Dry Creek Reservoir, California	215
Main Embankment of the Garrison Dam, Bismarck, North Dakota	215
Delta-Mendota Intake Canal and Tracy Pumping Plant, Central Valley, California	217
Dredging at Two Harbors, Minnesota	219
Flood Protection, Williamsport, Pennsylvania	221

MISCELLANEOUS

Project	Page
Housing Construction at Forth Worth Army Airfield, Texas	221
Viaduct Substructure, Chicago, Illinois	222
Aqueduct Tunnel, Boston, Massachusetts	222
Southern Pacific Cascade Line Railroad Relocation, Lane County, Oregon	223
Dupont Circle Underpass, Washington, D. C.	223

BY LOCATION

NEW ENGLAND

Project	Page
Highway Improvement, New Hampshire	193
Taxiway at Logan Airport, Boston, Massachusetts	185
Mystic River Bridge Piers, Massachusetts	207
Tully Dam, Royalston, Massachusetts	211
Aqueduct Tunnel, Boston, Massachusetts	222
Well Pump Station, Newtown, Connecticut	179
Connecticut River Bridge	203

SOUTH

Project	Page
Lamberts Point Sewage Treatment Plant, Virginia	181
Concrete Pavement and Bridge Over Angelico Creek, Virginia	203
Watermain, Jefferson, Georgia	179
Airport Improvements, Georgia	187
Bituminous Surfaced Road, Statesboro, Georgia	197
Road Bridge and Approaches, Georgia	204
Locks No. 27, Chain of Rocks Canal, Mississippi River	211
Cement Concrete Pavement, Baton Rouge, Louisiana	195
Bank Protections along Red River, Shreveport, Louisiana	211
Sanitary Sewer and Water Main Extensions, McKenzie, Tennessee	183

MIDDLE ATLANTIC

Project	Page
Sewer Extension, Idlewild, New York	184
Van Wyck Expressway, Queens, New York	199
Highway and Railroad Bridges, Newark, New Jersey	207
Sewerage and Waterworks Additions, Hamburg, Pennsylvania	185
Macadam Surfaced Road, Pennsylvania	190
Flood Protection, Williamsport, Pennsylvania	221
Baltimore Airport Runways, Maryland	185
Paving at International Airport, Baltimore, Maryland	189
Elevated Highway, Washington, D. C.	189
Dupont Circle Underpass, Washington, D. C.	223

WEST OF MISSISSIPPI

Project	Page
Highway, Worthington, Minnesota	190
Dredging at Two Harbors, Minnesota	219
Stormwater Channel, E. St. Louis, Missouri	183
Highway and Culvert, Grundy County, Missouri	201
Gravel Base Road, West Memphis, Arkansas	193
Little Red River Bridges, Arkansas	204
Water Storage Tank, Bismarck, North Dakota	177
Main Embankment of the Garrison Dam, Bismarck, North Dakota	215
Interceptor Sewer, Dallas, Texas	181
Housing Construction at Fort Worth Army Airfield, Texas	221
Big Thompson Project, Colorado	208

MIDDLE WEST

Project	Page
Water Pipe Lines, Delaware, Ohio	177
Improvements at Toledo Municipal Airport, Ohio	187
Reinforced Concrete Road, Lawrence County, Indiana	193
Viaduct Substructure, Chicago, Illinois	222
Watermain, Milwaukee, Wisconsin	175
Relaying Combined Sewers, Milwaukee, Wisconsin	183
Racine Street Bridge, Janesville, Wisconsin	207

FAR WEST

Project	Page
Highway Improvement, Utah	199
Highway Improvements, White Pine County, Nevada	201
Southern Pacific Cascade Line Railroad Relocation, Lane County, Oregon	223
Sanitary Sewers, Fresno, California	179
Surfacing State Highway, California	197
Reinforced Concrete Bridge, Los Angeles, California	203
Big Dry Creek Reservoir, California	215
Delta-Mendota Intake Canal and Tracy Pumping Plant, Central Valley, California	217

Watermain, Milwaukee, Wisconsin

OWNER: City of Milwaukee, Wisconsin; Joseph P. Schwada, City Engineer.

PROJECT: Laying of watermains along N. 3 St., W. Vine St., to W. Wright St., in Milwaukee, Wisconsin. Work involves removal of existing service and water pipes and installation of service pipes, ranging from ¾ in. to 2 in. in size, and of cast-iron pipes, ranging from 3 in. to 48 in., including 1,666 ft. of the ¾ in. service pipe, 4,260 ft. of 8 in. c. i. pipe.

CONDITIONS: City of Milwaukee will furnish water pipe, gate valves and hydrants. It will be necessary to break out a brick and concrete base pavement. Ground is of clay composite. All excavated materials are to be removed and trenches backfilled with sand and gravel. Access to job site is by highway only. Contract completion date is November 15, 1947. Skilled labor wage rates range from $1.85 to $2.15 per hr. Semi-skilled wage rate is $1.65, and common labor rate, $1.45 per hr.

BIDS: Four bids were received, ranging from the contract low of $91,738.65 to $98,547.43. Contract was awarded August 15, 1947.

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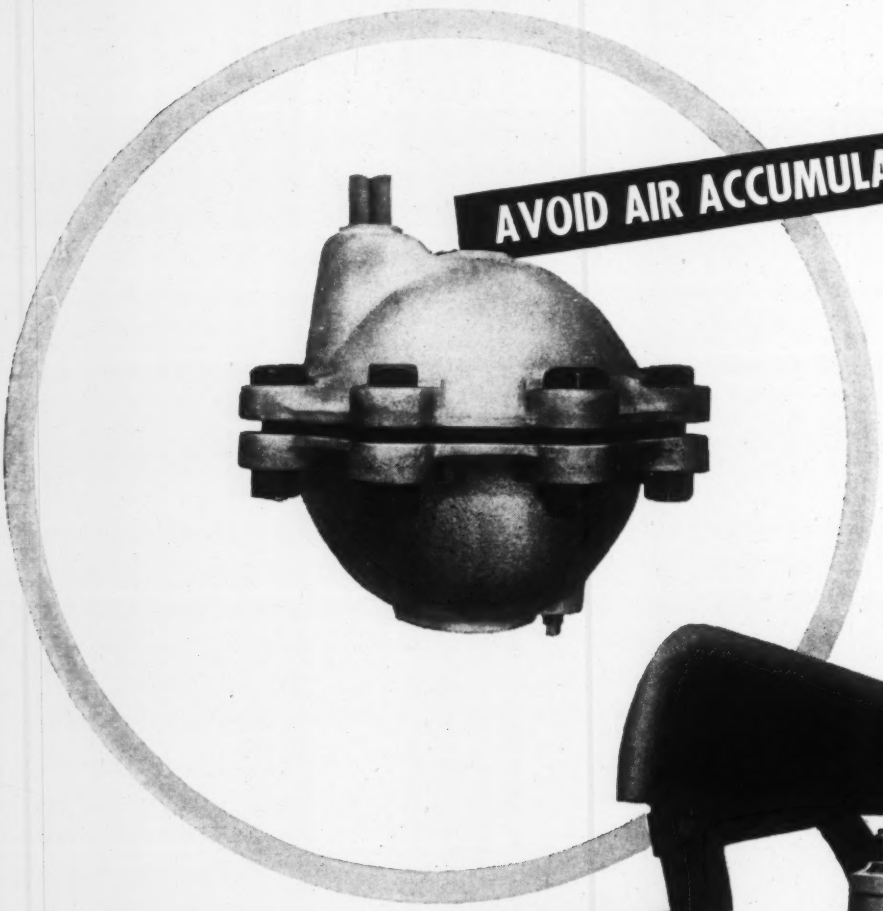

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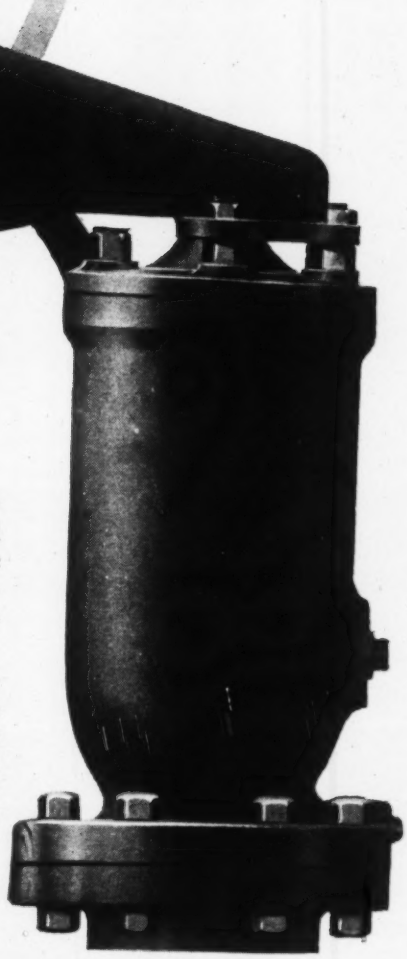
Simplex Air Inlet Valves permit the expulsion of air when lines are being filled, and admit air in large quantities should a break in the line occur. Damage to thin walled pipes caused by release of water and the formation of vacuums at higher points is prevented by the use of Simplex Air Inlet (vacuum breaking) Valves.

For full information and bulletins, write the Simplex Valve & Meter Company, 6751 Upland Street, Philadelphia 42, Pa.



SIMPLEX

VALVE AND METER COMPANY

Watermain, Milwaukee, Wisconsin

Continued from preceding page

LIST OF BIDDERS:

1. L & L Service Co., Milwaukee, Wis. (contract) ... $91,738.65
2. R-W Const. Co., Milwaukee, Wis. ... 92,527.20
3. Tomaro, Carle & Tomasini, Cudahy, Wis. ... 96,847.80
4. Old Const. Co., Milwaukee, Wis. ... 98,547.43

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Service pipe—¾ in.	1,666 f	$5.25	$5.25	$5.60
2	Service pipe—1 in.	362 f	5.25	5.60	5.50
3	Service pipe—1¼ in.	62 f	5.75	6.50	6.00
4	Service pipe—2 in.	24 f	6.25	8.50	7.50
5	Cast iron pipe—3 in.	21 f	6.75	9.00	9.50
6	Cast iron pipe—4 in.	28 f	7.00	9.25	9.50
7	Cast iron pipe—6 in.	149 f	8.50	7.80	8.75
8	Cast iron pipe—8 in.	4,260 f	8.25	7.90	8.00
9	Cast iron pipe—12 in.	1,980 f	7.80	8.30	8.90
10	Cast iron pipe—16 in.	1,850 f	8.50	8.80	9.80
11	Cast iron ppe—20 in.	20 f	26.00	16.50	18.00
12	Cast iron pipe—36 in.	9 f	27.00	44.00	30.00
13	Cast iron pipe—48 in.	89 f	45.00	43.60	40.00
14	Hydrant pipe—6 in.	341 f	8.50	7.25	8.75
15	Blow off pipe—6 in.	25 f	8.50	7.75	7.00
16	Hydrant drain—3 in.	341 f	2.50	2.00	3.00
17	Set gate valves—2 in.	5 ea	4.00	12.00	7.00
18	Set gate valves—3 in.	2 ea	5.00	12.50	9.00
19	Set gate valves—4 in.	5 ea	5.00	15.00	10.00
20	Set gate valves—6 in.	31 ea	10.00	18.00	12.00
21	Set gate valves—8 in.	30 ea	12.00	22.00	15.00
22	Set gate valves—12 in.	8 ea	15.00	25.00	20.00
23	Set gate valves—16 in.	3 ea	22.00	28.00	30.00
24	Set gate valves—20 in.	1 ea	35.00	35.00	50.00
25	Set hydrants	30 ea	20.00	33.00	35.00
26	Shut off small sew.	5 ea	30.00	22.00	20.00
27	House sewer extensions	6 ea	22.00	40.00	50.00
28	Const. gate valve manhole	1 ea	250.00	250.00	300.00
29	Const. air cock manhole	1 ea	200.00	250.00	300.00
30	Install. bubbler assembly	1 ea	175.00	120.00	200.00
31	Abandoning fire cisterns	4 ea	125.00	85.00	50.00
32	Remove service pipe—2 in.	38 f	3.00	4.00	4.00
33	Remove service pipe—3 in.	13 f	3.00	4.00	4.00
34	Remove water pipe—6 in.	84 f	5.00	5.50	6.00
35	Remove water pipe—4 in.	32 f	4.00	4.00	6.00
36	Remove water pipe—8 in.	25 f	6.00	6.50	6.00
37	Remove water pipe—12 in.	18 f	6.00	7.00	10.00
38	Remove water pipe—16 in.	5 f	8.00	8.00	15.00
39	Remove water pipe—36 in.	9 f	20.00	12.00	25.00
40	Remove hydrant pipe—6 in.	73 f	5.00	8.00	6.00

Water Pipe Lines, Delaware, Ohio

OWNER: City of Delaware, Ohio; Burgess & Niple, Engineers.

PROJECT: Installation of 23,000 ft. of 2 to 12 in. cast iron water pipe and appurtenances and repaving sections of street in Delaware County, Ohio.

CONDITIONS: Materials are to be furnished by contractor. Contract time is 210 days after delivery of material. Access to job site is by both rail and highway. Skilled labor wage rates range from $1.25 to $2.00 per hr.; semi-skilled, from $1.00 to $1.50 per hr.; and common, from $.65 to $1.25 per hr.

BIDS: Eight bids were received, ranging from the contract low of $99,862.00 to $131,345.25. Contract was awarded July 15, 1947.

LIST OF BIDDERS:

1. Christopher Const. Co., Columbus, Ohio (contract) ... $99,862.00
2. Thompson-Conie Co., Columbus, Ohio ... 108,229.00
3. L. Walker Fauber, Ashland, Ohio ... 115,334.10
4. Coleman & Trainor Co., Huntington, W. Va. ... 116,042.10
5. H. E. Miller, Columbus, Ohio ... 120,190.90
6. G. H. Leach Co., Bellefontaine, Ohio ... 127,097.00
7. B. Fatol, Cleveland, Ohio ... 128,321.00
8. Haddad Const. Co., Columbus, Ohio ... 131,345.25

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Cast iron pipe—12 in.	8,060 lf	$4.70	$5.00	$5.14
2	Cast iron pipe—8 in.	3,360 lf	3.00	3.20	3.59
3	Cast iron pipe—8 in.	1,360 lf	3.00	3.20	3.42
4	Cast iron pipe—8 in.	1,790 lf	3.00	3.20	3.48
5	Cast iron pipe—6 in.	3,885 lf	2.25	2.55	2.77
6	Cast iron pipe—6 in.	840 lf	2.25	2.55	2.72
7	Cast iron pipe—6 in.	350 lf	2.25	2.55	2.95
8	Cast iron pipe—6 in.	610 lf	2.25	2.55	2.77
9	Cast iron pipe—6 in.	1,395 lf	2.25	2.55	2.73
10	Cast iron pipe—6 in.	720 lf	2.25	2.55	3.12
11	Cast iron pipe—6 in.	310 lf	3.00	2.55	3.52
12	Cast iron pipe—2 in.	700 lf	1.65	1.75	1.69
13	Cast iron pipe fittings	26,000 lb	0.12	0.14	0.15
14	Corrugated steel pipe	223 lf	15.00	29.00	30.00
15	Valve, 12 in., box	10 ea	160.00	140.00	181.00
16	Valve, 8 in., box	12 ea	80.00	80.00	85.00
17	Valve, 6 in., box	55 ea	55.00	60.00	62.00
18	Valve, 2 in. & box	4 ea	30.00	45.00	35.25
19	Fire hydrant, 2-2½ in. N. S.	15 ea	125.00	155.00	148.00
20	Fire hydrant, 2-2½ in. N.	21 ea	90.00	130.00	118.00
21	Repaving traffic bound surface	400 ton	3.00	2.50	3.30
22	Repaving surface treated pavement	1,500 sy	3.00	1.50	2.00
23	Making connection under pressure	1 ea	400.00	150.00	175.00
24	Reloc. of sewer house connect. to new gr.	100 lf	2.50	1.50	1.00
25	Connection, 1 in., from exist. serv. line to new main	3 ea	18.00	15.00	25.00
26	Connection, ¾ in., from exist. serv. line to new main	3 ea	14.00	12.50	25.00
27	Copper service line—1 in.	30 lf	2.00	1.00	2.55
28	Copper service line—¾ in.	30 lf	1.80	0.90	2.50
29	Lowering 4 in. water line on Frank St.	200 lf	1.60	2.50	1.50

Water Storage Tank, Bismarck, North Dakota

OWNER: City of Bismarck, North Dakota; Lium and Burdick, Engineers.

PROJECT: Construction of a 500,000 gallon storage tank, booster pumping station and water mains within Watermain and Waterworks District Number 61 of the City of Bismarck, North Dakota. A great deal of the ditch must be dug in loose gravel soil which flows freely, thus, requiring shoring while the ditch is being dug. Numerous connections are to be made to the present water system and many of the present system connections are not shown on the plans, requiring extra precautions in digging. Much shoring and tamping is necessary in placing watermain 9 ft. below ground not to disturb gas main 4 ft. below ground level.

CONDITIONS: City of Bismarck, N. D. will furnish all of the cast iron pipe, cast iron fittings, gate valves and boxes, fire hydrants, lead and jute. Material to be furnished to the contractor to amount to approximately $240,000. Among the materials to be furnished by the contractor are air release valves, air release valve manholes, gate valve manholes, pit run gravel fill, pump house, flow meter and 500,000 gallon storage reservoir. Project must be completed not later than January 1, 1949. Access to job site is by rail and highway. Skilled labor wage rate is $1.75 per hour; semi-skilled, $1.45; and common, $.90.

BIDS: Seven bids were received, ranging from the contract low of $246,673.45 to $313,055.80. Contract was awarded August 21, 1947.

LIST OF BIDDERS:

1. Delzer Construction Co., Bismarck, N. D. (cont.) ... $246,673.45
2. Paul R. Kemper, Minot, N. D. ... 265,921.70
3. Rue Construction Co., Bismarck, N. D. ... 268,942.33
4. Northern Improvement Co., Fargo, N. D. ... 283,980.11
5. Northwestern Engr. Co., Rapid City, S. D. ... 299,850.96
6. G. E. Haggart, Fargo, N. D. ... 312,978.10
7. J. A. Shaw, Fargo, N. D. ... 313,055.80

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	C.i. main, 18"—west of Bell St.	6,535 lf	$4.02	$3.00	$4.25
2	C.i. main, 18"—east of Bell St.	3,203 lf	4.27	5.20	4.25
3	C.i. main, 16"—Ave. "A" to 11th St.	14,317 lf	4.36	5.00	4.55
4	C.i. main, 16"—Boulevard to tank	3,462 lf	4.51	3.00	4.64
5	C.i. main, 12"—Nineteenth St.	1,786 lf	3.27	2.80	3.00
6	C.i. main, 12"—Fifteenth St.	2,746 lf	3.07	2.80	3.00
7	Existing 12" connections	60 lf	5.00	6.00	7.50
8	C.i. main, 10"	1,548 lf	2.44	2.25	2.80
9	C.I. connections, 10"	226 lf	5.10	5.00	7.00
10	C.i. main, 8"	7,674 lf	1.90	1.90	2.30
11	C.i. connections, 8"	341 lf	3.49	4.00	6.00
12	Existing 8" connections	160 lf	4.50	2.70	6.00
13	C.i. connections, 6"	665 lf	4.31	3.50	4.00
14	Existing 6" connections	700 lf	4.00	2.05	4.00
15	Cast iron fittings	95,820 lb	0.06	0.10	0.06
16	Gate valves, 18"	7 ea	70.00	102.00	90.00
17	Gate valves, 16"	25 ea	67.00	81.60	65.00

Continued on next page

Sometimes It's a "Pipe"
To Reduce PIPE COSTS!

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STEEL AND
ALLOY STEEL PIPE

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ELBOWS
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LANCASTER IRON WORKS, INC.
LANCASTER, PENNA., U. S. A.

Water Storage Tank, Bismarck, North Dakota

Continued from preceding page

18	Gate valve & box, 12"	23 ea	62.00	68.00	65.00
19	Gate valve & box, 10"	12 ea	40.50	54.40	50.00
20	Gate valve & box, 8"	51 ea	29.00	40.80	30.00
21	Gate valve & box, 6"	60 ea	24.50	34.00	22.00
22	Gate valve & box, 4"	1 ea	30.00	27.20	20.00
23	Fire hydrant, 6"	18 ea	50.00	54.40	50.00
24	Fire hydrant, 8"	4 ea	75.00	81.60	60.00
25	Air release valves	2 ea	100.00	68.00	100.00
26	Air release valves	2 ea	400.00	204.00	300.00
27	Gate valve manholes (no. 1)	32ea	225.00	204.00	300.00
27a	Gate value manholes (no. 2), alternate	32 ea	250.00	.....	300.00
28	Cutting pavement & driveways	20,000 sf	0.25	0.55	0.50
29	Pit run gravel fill	1,000 cy	2.00	3.40	2.00
30	Tamping backfill	6,000 sy	0.50	1.40	0.50
31	Restoring sod	100 sy	1.50	1.40	1.50
32	Pump house	1 ea	8,806.00	8,000.00	9,500.00
33	Pump connections	1 ea	650.00	680.00	800.00
34	Pump—electric, 1500 GPM	1 ea	2,500.00	2,720.00	2,500.00
35	Pump-dual drive, 1500 GPM	1 ea	4,200.00	4,350.00	3,900.00
36	Flowmeter	1 ea	750.00	544.00	700.00
37a	Pressure tank—concrete—earth cover	1 ea	35,122.00	40,000.00	40,121.00
38	Rock excavation	50 cy	20.00	27.00	20.00
41	Existing 16" connections	60 lf	5.00	5.00	8.50
42	Removing existing 6" water pipe	222 lf	0.00	3.00	0.50

Watermain, Jefferson, Ga.

OWNER: Jefferson, Ga.; J. R. Bracewell & Assoc., engrs.

PROJECT: Installation of 23,075 linear feet of 2 in., 6 in. and 8 in. cast iron pipe mains and gate valves; replacement of 250 linear feet of paving. Project includes outside piping and drains around filtration plant.

CONDITIONS: City of Jefferson furnished 3,000 linear feet of 6 in. pipe to be purchased by general contractor. Access to job site is by rail and highway. Stipulated contract time is 180 days. Skilled labor wage rate is $2.00 per hour; semi-skilled, $.85; and common, $.75.

BIDS: Six bids were received, ranging from the contract low of $46,973 awarded Aug. 12, 1947 to $62,000.

LIST OF BIDDERS:

1. M. G. Aldridge, Macon, Ga. (contract) $46,973
2. J. B. McCrary Engineering Corp., Atlanta, Ga. 49,315
3. E. N. Murray, Buena Vista, Ga. 49,555
4. W. C. Shepherd, Atlanta, Ga. 50,576
5. C. Y. Thomason, Greenwood, S. C. 52,916
6. A. H. Guion, Charlotte, N. C. 62,000

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Outside pipe & drain	lump sum	$1,854.00	$1,425.00	$1,200.00
2	Cast iron pipe, 8"	2,000 lf	3.00	2.95	3.00
3	Cast iron pipe, 6"	13,650 lf	2.05	2.20	2.20
4	Cast iron pipe, 2"	6,525 lf	.85	.96	1.00
5	Gate valve & roadway box, 6"	17 ea	40.00	52.00	60.00
6	Gate valve & roadway box, 2"	8 ea	70.00	76.00	80.00
7	Special casting	5 ton	220.00	225.00	300.00
8	Paving taken up and replaced	250 lf	1.00	2.00	1.00
9	Fire hydrants	26 ea	110.00	93.00	100.00
10	Excavation for trenches, per ton	25 cy	10.00	15.00	6.000

Well Pump Station, Newtown, Conn.

OWNER: State of Connecticut, Office of the Comptroller, Hartford; Henry Souther Engrg. Co., engineers.

PROJECT: Construction of two well pump stations and pipe line at the Fairfield State Hospital, Newtown, Connecticut. Work includes installation of two 700 gpm. turbine pumps, 3 sump pumps, 4,225 lin. ft. of 10 in. cast iron pipe, and construction of a service road, 3,510 lin. ft. long and a 20 ft. span bridge.

CONDITIONS: The supplementary unit prices tabulated below were submitted to show the changes in the amount of earth, trench, rock and bridge excavation due to special conditions found at site. Access to job site is available by both rail and highway. All materials are to be furnished by contractor. Project to be completed by May 1, 1948. Stipulated minimum skilled labor wage rates per hr. are: carpenters, $1.50; masons, $1.87½; engineers, $2.00. Semi-skilled labor wage rate ranges from $1.25 to $1.50 per hr. and common labor, from $1.00 to $1.25 per hr. Contract was awarded November 1, 1947.

BIDS: Four bids were received, ranging from the contract low of $98,850.00 to $121,294.50. Contract was awarded November 1, 1947.

LIST OF BIDDERS:

1. Seminole Const. Co., East Hartford, Conn. (contract) $98,850.00
2. N. Benvenuti, New London, Conn. 104,700.00
3. Charter Oak Const. Co., Hartford, Conn. 106,530.00
4. De Fonce Const. Co., Bridgeport, Conn 121,294.50

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Constructing two pumping stations complete except pumps, piping and electrical work	lump sum	$8,200.00	$8,800.00	$8,000.00
2	Turbine pumps—700 gpm	2 ea	1,500.00	3,400.00	1,600.00
3	Sump pumps	3 ea	100.00		100.00
4	Trench excavation & backfill—6' depth and less	3,180 cy	2.50	2.40	1.00
5	Trench excavation & backfill—greater than 6' depth	550 cy	4.00	4.00	4.80
6	Rock	10 cy	10.00	12.00	15.00
7	Pipe lines, valves, fittings, and piping in pumping stations	lump sum	26,000.00	22,500.00	29,000.00
8	Electric wiring & distributions systems, & electrical equipment	lump sum	36,000.00	45,200.00	44,500.00
9	Service road—clearing, grubbing, preparing subgrade and ditches	3,510 lf	2.00	1.50	2.00
10	Road gravel	1,920 cy	1.50	1.25	2.00
11	Culverts	lump sum	2,500.00	1,000.00	1,200.00
12	Bridge	lump sum	2,700.00	4,500.00	3,500.00
	Supplementary Unit Prices				
13	General earth excavation		1.00	1.25	1.00
14	Trench excavation to 6' depth		2.50	1.50	1.00
15	Trench excavation over 6' depth		4.00	2.50	4.80
16	Bridge excavation		3.00	10.00	10.00
17	Rock excavation		10.00	12.00	15.00
18	Class A concrete including forms		60.00	35.00	45.00
19	Class B concrete including forms		50.00	30.00	42.00
20	Class B concrete without forms		20.00	20.00	25.00
21	Reinforcing steel in place		.20	.10	.20
22	Selected fill		1.00	1.00	2.00
23	Road gravel		1.50	1.25	2.00
24	Tile drains, 6", including excavation & backfill		3.00	1.50	3.00
25	Tile drains, 4", including excavation & backfill		2.50	1.40	2.50
26	Cast iron B & S pipe, 10", Class 150		5.00	4.00	6.10
27	1 Conductor # 1/0 power cable		.....	.496	.62
28	1 Conductor # 2 power cable		.....	.385	.56
29	7 Conductor # 12 control cable		.....	.523	.57
30	Fibre conduit, 3", fed. spec. WC 581 Type I		.....	.186	.46
31	Fibre conduit, 3", fed. spec. WC 581 Type II		.....	.186	.46
32	Cable manholes		200.00	225.00	250.00

Sanitary Sewers, Fresno, California

OWNER: City of Fresno, California; A. Segal, City Engineer.

PROJECT: Construction of sanitary sewers in McKinley Park, Lamona Land, Fresno, California. Work involves the laying of 6,406 lin. ft. of 12" concrete pipe; 2,555 lin. ft. of 10" concrete pipe; 17,626 lin. ft. of 8" concrete pipe; and 16,444 lin. ft. of 6" concrete pipe.

CONDITIONS: All materials to be furnished by contractor. Access to job site is available by both railroad and highway. Contract time is 120 days. Minimum skilled labor rate is $1.375 per hour; semi-skilled, $1.15; and common labor, $1.15.

BIDS: Six bids were received February 13, 1947, ranging from contract low of $99,940.13 to $137,672.78.

LIST OF BIDDERS:

1. Downer Co., Inc., Stockton, Calif. (contract) ..... $ 99,940.13
2. Pacific Pipeline & Engineers Ltd.; El Cerrito, Calif. 101,292.52
3. Kovick Bros., Fresno, Calif. 114,880.40
4. Tout & Martin Contractors, Fresno, Calif. 119,395.10

Continued on next page

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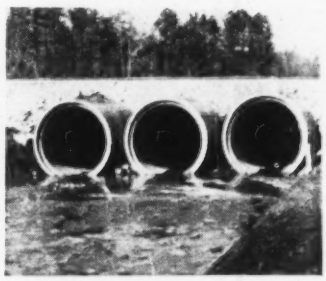

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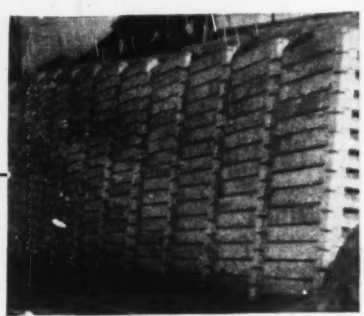

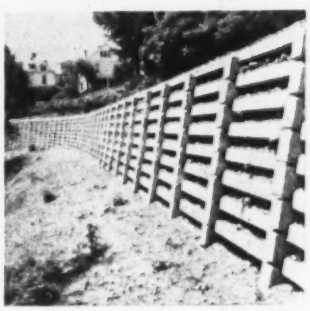

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Port Washington, New York	Clarksburg, West Virginia
Syracuse, New York	New Martinsville, West Virginia
Rochester, New York	Wheeling, West Virginia
Binghamton, New York	

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Sanitary Sewers, Fresno, California

Continued from preceding page

5. Manuel Smith, Oakland, Calif. 137,156.75
6. R. Goold & Son, Stockton, Calif. 137,672.78

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	12" concrete pipe sewer, in place	6,406 lf	$2.98	$3.79	$3.80
2	10" concrete pipe sewer, in place	2,555 lf	2.50	3.20	2.30
3	8" concrete pipe sewer, in place	17,626 lf	1.82	1.62	2.13
4	6" concrete pipe sewer, in place	16,444 lf	1.58	1.49	1.88
5	4" on 12" "Y" branches, in place	145 ea	2.52	5.00	5.00
6	4" on 10" "Y" branches, in place	54 ea	1.65	4.00	3.50
7	4" on 8" "Y" branches, in place	535 ea	1.27	2.50	3.00
8	4" on 6" "Y" branches, in place	716 ea	.81	2.10	2.00
9	Masonry manholes with cast iron frames and covers	84 ea	172.00	140.00	143.00
10	Lampholes with metal frames and covers	8 ea	30.00	30.00	30.00

Interceptor Sewer, Dallas, Texas

OWNER: City of Dallas.

PROJECT: Construction of an interceptor sewer from Cadiz St. to Inwood Rd. along Trinity River bottom in Dallas, Texas. Sewer to be 6′ to 7′6″ in diameter and varying in depth up to 25′.

CONDITIONS: All materials to be furnished by the contractor. Access to job site is by both rail and highway. Allotted time for completion is 270 consecutive calendar days. Specified wage rates are $1.60 per hour for skilled labor; $1.10 per hour for semi-skilled labor; and $.90 per hour for common labor.

BIDS: Five bids were received January 22, 1947, ranging from the contract low of $1,684,152.60 to $2,479,663.40.

LIST OF BIDDERS:

1. P. C. Sorenson Co., Dallas, Texas (contract) $1,684,152.60
2. E. H. Reeder Const. Co., Dallas, Texas 1,772,159.20
3. Dellone Const. Co., Dallas, Texas 1,986,849.00
4. McKenzie Const. Co., San Antonio, Texas 2,377,317.00
5. Oldt-Midwest Co., Dallas, Texas 2,479,663.40

	Item	Quantity	Unit Price (1)	(2)
1	Mono. sewer, 7′ 6″ diam., type "B", reinf.	2,210 lf	$77.50	$79.00
2	Mono. sewer, 7′ 6″ diam., type "C" reinf.	4,452 lf	79.00	81.00
3	Mono. sewer, 6′ 6″ diam. type "B" reinf.	6,276 lf	65.50	60.00
4	Mono. sewer, 6′ 0″ diam., type "A" reinf.	7,846 lf	36.50	37.50
5	Mono sewer, 6′ 0″ diam., type "B" reinf.	1,203 lf	37.50	43.00
6	Mono. sewer, 54″ diam., (Dallas br. trunk)	1,027 lf	32.00	59.65
7	Mono. sewer, 7′ 6″ diam., in tunnel	1,597 lf	125.00	153.50
8	Mono. sewer, 6′ 0″ diam., in tunnel	135 lf	100.00	133.00
9	Storm drain crossing struct. 59 + 40.42	lump sum	2,150.00	4,700.00
10	Storm drain crossing and transition	lump sum	4,100.00	7,500.00
11	Junc. struc. with M.H., 0 + 66	lump sum	1,500.00	2,400.00
12	Junc. struc. with M.H. 8 + 61.33	lump sum	1,320.00	1,950.00
13	Junc. struc. with M.H. 53 + 01.35	lump sum	1,250.00	1,850.00
14	Junc. struc. with M.H. 73 + 17.43	lump sum	1,550.00	2,300.00
15	Junc. struc. with M.H. 89 + 54.65 and 114 + 41	2 ea	700.00	825.00
16	Junc. struc. with M.H. and transition, 136 + 85	lump sum	1,350.00	900.00
17	Junc. struc. with M.H. 223 + 31.93	lump sum	600.00	600.00
18	Junc. struc. with M.H. on 51″ no. intercep.	lump sum	3,360.00	3,650.00
19	Sub-base and sub-drain for 7′ 6″ sewer	7,368 lf	2.10	3.30
20	Sub-base and sub-drain for 6′ 6″ sewer	6,305 lf	2.00	1.00
21	Sub-base and sub-drain for 6′ 0″ sewer	9,184 lf	1.70	1.00
22	Sub-base and sub-drain for 54″ sewer	1,027 lf	1.50	2.80
23	Timber piles, 10′, for 7′ 6″ sewer	204 lf	37.50	33.20
24	Timber piles, 15′, for 7′ 6″ sewer	174 lf	44.00	36.30
25	Timber piles, 20′, for 7′ 6″ sewer	282 lf	40.00	40.00
26	Timber piles, 25′, for 7′ 6″ sewer	216 lf	42.00	41.00
27	Timber piles, 30′, for 7′ 6″ sewer	156 lf	45.00	43.80
28	Timber piles, 10′ for 6′ 6″ sewer	48 lf	30.00	32.20
29	Timber piles, 15′, for 6′ 6″ sewer	104 lf	35.00	35.30
30	Timber piles, 20′, for 6′ 6″ sewer	472 lf	32.00	39.00
31	Timber piles, 25′, for 6′ 6″ sewer	240 lf	33.00	40.00
32	Timber piles, 30′, for 6′ 6″ sewer	96 lf	35.00	41.80
33	Type "M" M.H.s on 7′ 6″ mono. sewer	2 ea	850.00	1,000.00
34	Type "M" M.H.s on 6′ 6″ mono. sewer	2 ea	675.00	250.00
35	Type "M" M.H.s on 6′ 0″ mono. sewer	1 ea	575.00	200.00
36	Type "N" M.H.s on 54″ mono. sewer	2 ea	375.00	400.00
37	Box culvert sta. 134 + 93	lump sum	2,100.00	2,000.00
38	Ventilation str. and air conductor pipe	2 ea	860.00	1,000.00
39	Bulkhead in 7′ 6″ sewer	lump sum	100.00	150.00
40	Bulkhead in 6′ 0″ sewer	lump sum	75.00	120.00
41	Chimney pipe inlets on mono. sewers	34 ea	75.00	115.00
42	Protective coating on mono. sewers	318,000 sf	0.06	0.08
43	Union terminal turn track trestle	lump sum	5,000.00	5,000.00
44	Ex. strength reinf. conc. pipe—48″	62 lf	58.00	70.00
45	Ex. strength reinf. conc. pipe Pacific—30″	843 lf	19.00	30.00
46	Ex. strength reinf. conc. pipe Ced. Spgs—30″	2,665 lf	10.20	14.00
47	Std. strength reinf. conc. pipe Knights Br—27″	2,963 lf	9.00	13.25
48	Type "O" MH, Pacific Ave. trunk	3 ea	420.00	550.00
49	Type "O" MH, Cedar Spgs. trunk	7 ea	360.00	250.00
50	Type "O" MH, Knight's Br. trunk	8 ea	330.00	225.00
51	Class "C" concrete backfill	800 cy	15.00	15.00
52	Gravel backfill	3,200 cy	6.00	5.50
53	Class "C" conc. pipe cradle	430 cy	15.00	15.00
54	Cutting and replacing 9–6–9 conc. paving	450 sy	5.00	4.00
55	Cutting and replacing 7–6–7 conc. paving	295 sy	5.00	4.00
56	Cutting and replacing 1½" sur. and 12" rock base	320 sy	4.50	5.00
57	Cutting and replacing 2½" sur. and 10" rock base	54 sy	5.50	5.00
58	Cutting and replacing penet. pav. and 6" gr. base	308 sy	3.00	3.00
59	Cutting and replacing 7′ conc. laydown dr	40 sy	5.00	5.00
60	Cutting and replacing conc. curb and gutter	90 lf	2.60	3.00
61	Storm drain inlet and connection	lump sum	300.00	300.00

Lamberts Point Sewage Treatment Plant, Virginia

OWNER: Hampton Roads Sanitation District Commission, Norfolk, Virginia; Aldrich and Buck, New York City, Consulting Engineers.

PROJECT: Complete construction of a 20,000,000 gal. per day primary sewage treatment plant, including pumping, screening, settling, chlorinating, sludge digestion, sludge elutriation, sludge drying and gas collecting and utilizing facilities at Lamberts Point, Virginia.

CONDITIONS: The contract includes furnishing and installing all equipment except the equipment to be installed under Item 8 which is furnished under separate contracts. Materials furnished by owner amount to $93,000 worth of mechanical equipment. Stipulated contract time is 420 days from June 16, 1947. Access to job site is available by rail, highway and water. Skilled labor wage rates range from $1.50 to $2.00 per hr. Semi-skilled wage rate is $.80 per hr., and common, $.65 per hr.

BIDS: Three bids were received ranging from the contract low of $1,167,981 to $1,332,434. Contract was awarded June 7, 1947.

LIST OF BIDDERS:

1. Carpenter Const. Co., Norfolk, Va. (contract) $1,167,981.00
2. Tidewater Const. Corp., Norfolk, Va. 1,263,810.00
3. E. & E. J. Pfotzer, Norfolk, Va. 1,332,434.00

	Item	Quantity	Engineers' Estimate	Unit Prices (1)	(2)
1	Earth excavation and backfill				
	a Above elevation 100	35,000 cy	$2.50	$2.00	$4.00
	b Below elevation 100	7,000 cy	4.00	8.25	7.00
2	Sheeting left in place	10,000 f bm	100.00	100.00	80.00
3	Wood piling				
	a 30′ to 40′ long, or less	45,000 lf	1.10	.75	.72
	b Over 40′ to and including 50′ long	25,000 lf	1.20	.78	.70
	Over 50′ to and including 60′ long	3,000 lf	1.40	.65	.72
	d Over 60′ long	1,000 lf	1.50	.60	.65
	e Treating wood piles, additional price	2,500 lf	1.00	.90	1.10
4	Concrete masonry				
	a Class A concrete	7,500 cy	48.00	55.00	55.00
	b Class B concrete	500 cy	38.00	30.00	33.00
	c Class C concrete	100 cy	30.00	30.00	30.00
5	Portland cement, added or omitted	100 bbl	4.00	2.70	3.00
6	Steel reinforcement, added or omitted	10,000 lb	.10	.08	.10
7	Brick masonry in manholes, foundations, etc.	70 cy	60.00	80.00	60.00
8	Erecting equipment furnished by others	lump sum	21,000.00	13,056.00	8,300.00
9	Furnishing and installing sludge pumps	lump sum	5,000.00	8,502.00	8,000.00
10	Furnishing and installing sludge tank covers and accessories	lump sum	60,000.00	68,397.00	74,000.00
11	Furnishing and installing sludge heaters and appurtenances	lump sum	15,000.00	15,617.00	13,500.00
12	Furnishing and install ng sludge circulating pumps	lump sum	3,000.00	1,192.00	1,200.00
13	Furnishing and installing gas control equipment	lump sum	4,000.00	3,281.00	2,800.00
14	Furnishing and installing inside piping and appurtenances	lump sum	95,000.00	109,039.00	103,000.00
15	Furnishing and laying outside metal piping				
	a C. I. pipe, 4″ diam. and under	1,700 lf	2.00	1.64	2.00
	b C. I. pipe, 6″, 8″ and 12″ diam.	900 lf	3.00	3.18	3.25
	c W. I. and steel pipe, 2″, 3″ diam. and under	1,400 lf	1.50	1.34	1.40

Continued on next page

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and others

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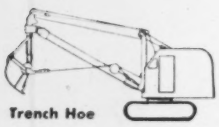
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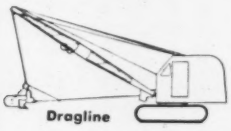
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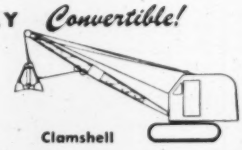
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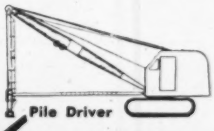
Pile Driver

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Lamberts Point Sewage Treatment Plant, Virginia

Continued from preceding page

d Steel pipe, with dresser couplings, 6", 8" diam	400 lf	5.00	3.90	5.00
e Laying only, rubber lined chlorine pipes	350 lf	2.00	1.46	1.50
16 Furnishing and installing outside gate valves, valve boxes and hydrants	lump sum	2,000.00	1,086.00	1,200.00
Furnishing and laying outside vitrified and concrete piping				
a Vitrified pipe 4" diam	600 lf	1.00	.68	1.00
b Vitrified pipe 6" and 8" diam	1,400 lf	1.50	1.26	1.40
c Vitrified pipe 12" diam	700 lf	2.00	2.03	2.25
d Reinforced concrete pipe 42" diam	140 lf	18.00	9.00	12.00
e Reinforced concrete pipe 48" diam	150 lf	20.00	11.00	14.50
f Reinforced concrete pipe 54" diam	200 lf	25.00	13.50	18.00
18 Furnishing and installing miscellaneous metal work	lump sum	27,000.00	26,631.00	32,000.00
19 Furnishing and installing meters and thermometers	lump sum	14,800.00	16,966.00	17,750.00
20 Furnishing and installing crane and hoist	lump sum	5,000.00	4,500.00	4,000.00
21 Constructing masonry superstructures and appurtenances	lump sum	326,000.00	185,276.00	220,000.00
22 Furnishing and installing heating systems	lump sum	18,000.00	10,060.00	13,000.00
23 Furnishing and installing laboratory furniture	lump sum	8,000.00	1,987.00	6,000.00
24 Furnishing and installing electric light, power equipment and wiring	lump sum	50,000.00	47,946.00	43,000.00
25 Lumber used in foundations	2,000 f bm	150.00	200.00	200.00
26 Gravel foundations and selected fill				
a Gravel	200 cy	5.00	5.00	8.00
b Selected fill	200 cy	2.50	2.00	5.00
27 Constructing roadways and walks				
a Roadways	3,650 sy	3.00	2.50	2.00
b Walks	300 sy	3.00	2.50	2.00

Relaying Combined Sewers, Milwaukee, Wisconsin

OWNER: City of Milwaukee, Wisconsin; J. P. Schwada, City Engineer.

PROJECT: Relaying of sewers in the same location as old sewers which are to be removed. All existing house sewers to be reconnected to new sewer. All vitrified clay pipe to be used. Manholes of concrete blocks, inside D3'-6". Average depths of sewers are as follows: for 18" sewer, 9.5 ft.; for 21", 12.0 ft.; for 27", 16.0 ft.; for 30", 16.5 ft.; and for 36", 15.0 ft. Sand backfill for all trenches and macadam pavement in street.

CONDITIONS: Ground conditions expected for the first 11 ft., dry filling; for next 3 ft., soft sandy clay (wet); and for the next 3 ft., peat (dry). No materials will be furnished by the owner. Access to job site is available by rail and highway. Stipulated contract time is 60 calendar days. Skilled labor wage rate ranges from $1.85 to $2.15 per hr. Semi-skilled rate is $1.65 per hr.; common rate is $1.45.

BIDS: Three bids were received June 26, 1947, ranging from the contract low of $45,363.75 to $45,580.00.

LIST OF BIDDERS:

1. R. W. Const. Co., Milwaukee, Wis. (contract) ... $45,363.75
2. L. and L. Service Co., Milwaukee, Wis. ... 45,554.00
3. Tomaro, Carle and Tomasini ... 45,580.00

Item	Quantity	Unit Prices (1)	(2)	(3)
1 House sewers and drains	250 lf	$9.00	$6.00	$8.00
2 Sewer 0–2, 18 in.	134 ea	21.50	21.00	18.00
3 Sewer 0–3, 18 in.	85 ea	23.75	22.00	22.00
4 Sewer tunnel, 0–4, 18 in.	68 lf	39.25	39.00	36.00
5 Sewer 0–2, 21 in.	160 ea	22.50	22.00	20.00
6 Sewer tunnel, 21 in.	195 lf	39.00	40.00	39.00
7 Sewer, 27 in.	322 lf	25.50	28.50	37.00
8 Sewer, 30 in.	61 lf	28.00	30.00	38.00
9 Sewer tunnel 0–4, 36 in.	53 lf	47.00	48.00	46.00
10 Sewer, 0–3, 36 in.	132 lf	32.50	33.00	39.00
11 Sewer 0–2, 36 in.	136 lf	28.75	31.00	32.00
12 D manhole with OD conn.	1 ea	400.00	350.00	300.00
13 Manhole	1 ea	400.00	400.00	300.00
14 Manhole with OD conn.	1 ea	350.00	325.00	275.00
15 Underpin, manholes	2 ea	200.00	125.00	175.00
16 Underpin, manholes const., OD conn.	2 ea	250.00	225.00	225.00
17 Manholes	8 ea	280.00	250.00	200.00

Sanitary Sewer and Water Main Extensions, McKenzie, Tenn.

OWNER: City of McKenzie, Tenn.; W. W. Turner Co., engrs.

PROJECT: Project includes excavation, backfill, cleanup and installation of 6" cast iron water pipe, cast iron gate valve, fire hydrants, 8" clay sewer pipe—standard and extra strength, 6" clay sewer pipe, 8" cast iron sewer pipe and standard brick manholes; furnishing and installing sewage ejector, expelsor (complete in place), including piping, controls, compressor, but not including concrete pit.

CONDITIONS: All materials, tools, equipment and superintendency of labor are to be furnished by the contractor. Stipulated contract time is 240 calendar days.

BIDS: Three bids were received, ranging from the contract low of $70,219.00 to $75,669.29. Contract was awarded September 30, 1947.

LIST OF BIDDERS:

1. Volz Const. Co., Ripley, Tenn. (contract) ... $70,219.00
2. Bush Building Co., Nashville, Tenn. ... 74,499.85
3. Gregory-Barr ... 75,669.29

Item	Quantity	Unit Prices (1)	(2)	(3)
1 Cast iron pipe	18,137 lf	$2.25	$2.25	$2.30
2 Cast iron fittings	13,251 lb	.13	.18	.18
3 Cast iron fittings	1,566 lb	.12	.12	.11
4 Cast iron gate valve—6"	24 ea	50.00	65.00	60.00
5 2-Way fire hydrant	31 ea	110.00	125.00	120.00
6 3-Way fire hydrant	2 ea	130.00	140.00	130.00
7 Vit. clay pipe, 0 to 6'—8" dia.	438 lf	2.25	2.50	2.25
8 Vit. clay pipe, 0 to 6'—8" dia.	940 lf	1.85	2.00	1.95
9 Vit. clay pipe, 6' to 8'—8" dia.	202 lf	2.00	2.30	2.35
10 Vit. clay pipe, 8' to 10'—8" dia.	193 lf	2.50	2.75	2.85
11 Vit. clay pipe, 10' to 12'—8" dia.	307 lf	3.00	3.25	3.60
12 Vit. clay pipe, 12' to 14'—8" dia.	709 lf	4.00	4.00	5.10
13 Vit. clay pipe, 14' to 16'—8" dia.	351 lf	5.00	6.00	7.00
14 Vit. clay pipe, 16' to 18'—8" dia.	45 lf	6.00	8.00	10.00
15 "Y" branch—8"	6 ea	2.00	3.00	4.00
16 30 degree curve—8"	6 ea	2.00	3.00	3.00
17 Vit. clay pipe, 0 to 6'—6" dia.	100 lf	1.80	1.50	1.75
18 8" Barrel x 6" Y branch	8 ea	2.00	3.00	3.50
19 Short radius curve—6"	8 ea	2.00	3.00	2.00
20 Vit. clay pipe, 0 to 6'—8" dia.	288 lf	3.35	3.50	3.75
21 Brick manhole, 0 to 6'	4 ea	130.00	135.00	140.00
22 Brick manhole, 6' to 8'	1 ea	170.00	155.00	170.00
23 Brick manhole, 10' to 12'	3 ea	250.00	190.00	230.00
24 Brick manhole, 12' to 14'	3 ea	290.00	210.00	260.00
25 Brick manhole, 14' to 16'	1 ea	320.00	300.00	290.00
26 Brick manhole, 16' to 18'	1 ea	360.00	350.00	340.00
27 Drop brick manhole, 8' to 10'	2 ea	250.00	200.00	230.00
28 Sewage ejector & piping	lump sum	2,400.00	3,000.00	2,500.00
29 Chert	1,000 cy	2.50	3.00	4.00
30 Class "A" concrete	37.2 cy	75.00	75.00	65.00
31 Reinforcing steel	5,564 lb	.10	.10	.10
32 Culvert excavation	160 cy	2.00	10.00	2.50

Stormwater Channel, E. St. Louis, Mo.

OWNER: Board of Trustees, East Side Levee and Sanitary District, East St. Louis, Ill.; Homer and Shifrin, engrs.

PROJECT: *Section II:* Construction of stormwater channel with reinforced concrete bottom lining, including reconstruction and extension of existing sanitary and stormwater sewer outlets and incidental pipe culverts and headwall structures between the south end of the new B. & O. S. W. Railroad culvert northwest of the intersection of 23rd Street and Morris Ave. and the city corporate limits' line at Verlie Ave. in East St. Louis, Ill. *Section III:* Construction of stormwater channel with reinforced concrete bottom lining, including reconstruction and extension of existing

Continued on next page

Stormwater Channel, E. St. Louis, Mo.

Continued from preceding page

sanitary sewers and stormwater sewer outlets and removal of present sanitary box sewer below the Village of Washington Park pump station and replacement of the same with three pipe siphons. Work also includes installation of new pipe culverts and headwall structures around pipe culverts and on ends of stormwater sewer outlets and removal of existing culverts and construction of new reinforced concrete box culverts at Washington Park Boulevard, 56th St. and Caseyville Ave. Stormwater channel lies in Washington Park and runs from eastern corporate limits of East St. Louis to connect at the east with existing culvert under the Alton and Southern Railroad.

CONDITIONS: All materials to be furnished by contractor. Access to job site is available by highway only. Contract stipulates that Section II be completed by July 1, 1949 and Section III, by February 1, 1949. Prevailing labor wage rates per hr. are: bricklayers, $2.50; structural iron workers, $2.25; hoisting engineers, $2.40; and common labor on heavy construction. $1.75.

BIDS: *Section II:* Three bids were received, ranging from the contract low of $203,413.00 to $220,341.50. *Section III:* Three bids were received, ranging from the contract low of $225,490.25 to $250,434.50. Contracts for both sections were awarded January 7, 1948.

LIST OF BIDDERS:

Section II:

1. H. H. Hall Const. Co., East St. Louis, Ill. (contract) $203,413.00
2. Keeley Bros. Const. Co., East St. Louis, Ill. 205,543.75
3. Moore Bros., Inc., East St. Louis, Ill. 220,341.50

tract $225,490.25

2. H. H. Hall Const. Co., East St. Louis, Ill. 229,667.00
3. Moore Bros., Inc., East St. Louis, Ill. 250,434.50

	Item	Quantity	Unit Prices (1)	(2)	(3)
	Section II:				
1	Channel excavation	69,800 cy	$1.10	$1.18	$1.18
2	Reinforced concrete channel lining	2,470 cy	43.70	43.00	47.00
3	Reinforced concrete headwall structures	28 cy	100.00	108.00	110.00
4	Brick masonry in manholes	580 cf	4.50	4.85	4.80
5	V. C. pipe, 8", complete in place, including excavation and backfill	620 lf	9.00	10.00	9.60
6	Concrete pipe, 12" complete in place, including excavation and backfill	200 lf	7.00	4.25	9.00
7	Concrete pipe, 15", complete in place, including excavation and backfill	115 lf	8.00	4.80	10.20
8	Concrete pipe, 18", complete in place, including excavation and backfill	60 lf	12.00	5.50	14.50
9	Concrete pipe, 24", complete in place, including excavation and backfill	65 lf	15.00	6.75	18.00
10	Concrete pipe, 27", complete in place, including excavation and backfill	10 lf	17.00	12.00	20.00
11	Concrete pipe, 30", complete in place, including excavation and backfill	25 lf	20.00	15.00	22.00
12	Concrete pipe, 36", complete in place, including excavation and backfill	35 lf	24.00	18.00	24.50
13	Concrete pipe, 48", complete in place, including excavation and backfill	20 lf	27.00	30.00	32.50
14	V. C. pipe "Ts", 8", complete in place, per piece	2 ea	15.00	13.00	14.50
15	V. C. pipe "Ls", 8", complete in place, per piece	2 ea	12.00	13.00	12.00
16	Breaking into existing manholes or sewers and making connection, per place	5 ea	250.00	125.00	480.00
17	Cast iron manholes frames and covers, per set		40.00	45.00	48.00
18	Cast iron manhole steps, per piece		3.00	3.00	2.40
	Section III:				
1	Channel excav. incl. removal of all existing pipes, concrete boxes and culverts	29,700 cy	$1.32	$1.20	$1.35
2	Reinforced concrete channel lining	1,950 cy	43.00	44.00	50.00
3	Reinforced concrete headwall structures	52 cy	108.00	100.00	110.00
4	Brick masonry in manholes	300 lf	4.85	4.00	4.80
5	V. C. pipe, 6", complete in place, including excavation and backfill	230 lf	3.00	5.00	6.00
6	V. C. pipe, 8", complete in place, including excavation and backfill	460 lf	3.20	8.00	12.00
7	V. C. pipe, 10", complete in place, including excavation and backfill	135 lf	15.00	10.00	12.50
8	V. C. pipe, 18", complete in place, including excavation and backfill	75 lf	16.00	15.00	9.00
9	Concrete culvert pipe, 12", complete in place, including excavation and backfill	260 lf	4.25	10.00	9.50
10	Concrete culvert pipe, 15", complete in place, including excavation and backfill	220 lf	4.80	11.00	12.00
11	Concrete culvert pipe, 18", complete in place, including excavation and backfill	35 lf	5.50	16.00	17.00
12	Concrete culvert pipe, 21", complete in place, including excavation and backfill	100 lf	6.25	20.00	19.00
13	Concrete culvert pipe, 24", complete in place, including excavation and backfill	45 lf	6.75	22.00	23.00
14	V. C. pipe tee, 8", complete in place	1 ea	13.00	5.00	12.00
15	V. C. pipe ell, 8", complete in place	1 ea	13.00	4.00	13.00
16	V. C. pipe, 10", ⅛ bend, complete in place, per piece	4 ea	20.00	6.00	14.00
17	V C. pipe, 10", slants, complete in place, per piece	4 ea	20.00	6.00	14.00
18	Breaking into existing manhole and making connections thereto	1 ea	125.00	1,500.00	1,200.00
19	"Calco", 12" or equal backwater gate, including thimble, complete in place, per piece	5 ea	55.00	50.00	75.00
20	"Calco", 15", or equal backwater gate, including thimble, complete in place, per piece	9 ea	75.00	75.00	100.00
21	"Calco", 18", or equal backwater gate, including thimble, complete in place, per piece	2 ea	95.00	85.00	125.00
22	"Calco", 21", or equal backwater gate, including thimble, complete in place, per piece	6 ea	120.00	100.00	150.00
23	"Calco", 24", or equal backwater gate, including thimble, complete in place, per piece	2 ea	135.00	150.00	180.00
24	C. I. manhole frames and covers, per set	7 ea	45.00	44.00	48.00
25	Cast iron manhole steps, per step	30 ea	3.00	3.00	2.40
26	Reinforced concrete culvert across Washington Park Blvd., complete in place	lump sum	42,800.00	43,246.00	42,350.00
27	Reinforced concrete culvert across 56th Street, complete in place	lump sum	20,900.00	20,722.80	18,190.00
28	Reinforced concrete culvert across Caseyville Ave., complete in place	lump sum	20,150.00	18,033.20	22,450.00

Sewer Extension, Idlewild, New York

OWNER: The Port of New York Authority; John M. Kyle, Chief Engineer.

PROJECT: Construction of an extension to the Thurston Sewer at New York International Airport, Idlewild, Queens County, New York. Work includes 52,500 cu. yds. of excavation, 2,750,000 lbs. of concrete reinforcement, installation of 9,000 lin. ft. of piles; water, gas and concrete pipes, 2,700 sq. yds. of road pavement, and installation of Venturi meter.

CONDITIONS: Owner will furnish Venturi tube, manometer and meter. All other materials are to be furnished by contractor. Access to job site is available by highway. Project is to be completed within 12 months after date of commencement. Prevailing minimum wage rates per hour are: bricklayers, $2.75; carpenters, $2.75; structural iron workers, $3.00; hoisting engineers, $3.00; electrical workers, $2.50; and common labor, $1.50.

BIDS: Twelve bids were received, ranging from the contract low of $767,410.00 to $1,102,900.00. Contract was awarded February 10, 1948.

LIST OF BIDDERS:

1. Gull Contr. Co., Inc. & L. G. Defelice & Son, Inc. Flushing, N. Y. (contract) $767,410.00
2. Hendrickson Bros., Inc., Valley Stream, N. Y. 774,018.00
3. Andrew Catapano & Co., Glendale, N. Y. 780,825.00
4. Millman & Nazzaro Const. Corp., Brooklyn, N. Y. 838,490.00
5. Delhan Const. Co., Inc., Brooklyn, N. Y. 846,110.00
6. Horn Const. Co., Inc., New York, N. Y. 857,815.00
7. T & T Contr. Co., Brooklyn, N. Y. 875,575.00
8. Angelo Paino & Co., Inc., Brooklyn, N. Y. 912,885.00
9. Stock Const. Corp., New York, N. Y. 947,610.00
10. Lawrence J. Rice, Inc., Forest Hills, N. Y. 982,890.00
11. Del Balso Const. Corp., Brooklyn, N. Y. 1,044,570.00
12. Charles F. Vachris, Inc., Brooklyn, N. Y. 1,102,900.00

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Excavation	52,500 cy	$1.35	$1.50	$3.00
2	Fill	7,000 cy	.40	1.00	.50

Continued on next page

Sewer Extension, Idlewild, New York

Continued from preceding page

3	Concrete	15,200 cy	22.75	18.75	16.00
4	Portland cement	23,600 bbl	3.50	4.00	3.00
5	Concrete reinforcement	2,750,000 lb	.08	.095	.09
6a	Miscellaneous iron and steel	16,000 lb	.15	.30	.30
6b	Water pipe	44,000 lb	.30	.30	.30
6c	Gas pipe	3,000 lb	.60	.30	.30
7	Concrete pipe, 30" diameter	330 lf	7.00	20.00	15.00
8	Spur connections	8 ea	50.00	150.00	50.00
9	Furnishing pile driving equipment	lump sum	500.00	500.00	1,000.00
10	Piles	9,000 lf	.75	.50	.80
11	Road pavement	2,700 sy	3.25	3.00	3.00
12	Cinders	200 cy	3.00	4.00	2.00
13	Timber guard rail	1,000 lf	1.50	1.50	2.00
14	Electric conduit, 3" diameter	500 lf	3.00	3.00	5.00
15	Pressure tube conduit, 4" diameter	50 lf	7.00	2.00	5.00
16	Asphalt emulsion	2,500 gal	.30	.25	.25
17	Installation of venturi meter	lump sum	4,500.00	3,293.00	12,000.00

Sewerage and Waterworks Additions, Hamburg, Pa.

OWNER: Department of Property and Supplies, Harrisburg, Pa.

PROJECT: Sewage treatment and water filter plants additions at Tuberculosis Sanitarium No. 3, Hamburg, Pa. Work includes complete installation of alum house, 14'3" x 10'11" x 8', enlargement of 9'x11' filter wash house tank; installation of concrete covers for (1) circular clean well, 19'2" dia. and (2) square clean well, 19'2" x 11'2"; construction of pipe bridge, 12' long, over mill creek; sludge beds; glass enclosure, 25' x 25' x 5'6"; resettling basin 20' x 8' x 2'4"; and an imhoff tank, 24' deep, 12' inside diameter.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by both rail and highway. Stipulated contract time is 180 calendar days. Stipulated wage rates per hr. are: skilled labor, $1.75; semi-skilled labor, $1.40; and common labor, $1.10.

Base bids on this project were submitted in one lump sum without tabulation. Since the additional work on which unit bids were submitted is subject to several alternate plans, there are no definite quantities measurable.

BIDS: Four bids were received, ranging from the contract low of $66,455.00 to $90,390.00. Contract was awarded March 8, 1948.

LIST OF BIDDERS:

1. Robert E. Lamb & Son, Phila., Pa. (contract) $66,455.00
2. Hadley Contr. & Const. Co., Phila., Pa 76,560.00
3. Wark & Co., Phila., Pa 89,280.00
4. Harry Gill Co., Phila., Pa 90,390.00

	Item	Unit Prices (1)	(2)	(3)
1	Trench earth excavation, per cu. yd	$4.75	$10.00	$8.50
2	Bulk earth excavation, per cu. yd	3.75	8.00	6.50
3	Earth embankment, per cu. yd	2.50	4.00	2.25
4	Cast iron frames and covers, per lb	.20	.20	.30
5	Class A concrete, except form work	18.00	20.00	19.00
6	Form work, sq. ft. contact surface	1.25	1.00	.90
7	Reinforcing steel	.10	.12	.1025
8	Rock excavation, per cu. yd	15.00	42.00	30.00
9	Furnishing and laying 6" terra cotta pipe, per lin. ft.	5.00	1.45	1.25
10	Furnishing and laying 6" cast iron pipe, per lin. ft.	6.00	5.80	3.00
11	Furnishing and laying 8" cast iron pipe, per lin. ft.	7.50	9.00	4.00

Taxiway at Logan Airport, Boston Massachusetts

OWNER: Commonwealth of Massachusetts Department of Public Works.

PROJECT: Construction of partial permanent Taxiway #1, South Taxiway, and portions of runways "Parallel A" and "Parallel C". The work includes excavation, grading, drainage, gravel sub-base and miscellaneous work all in accordance with plans, and as directed by the engineer.

CONDITIONS: Contractor must schedule operations so that there is no interference with air traffic at airport. Access to job site is by rail and highway. Contract time is 95 calendar days. Wage rates specified are: hoisting engineer, $1.65 per hour; crane operator (power shovel), $2.175; bulldozer operator, $1.65; bricklayer, $1.995; carpenter, $1.75; iron worker, $1.85; painter, $1.625; and common labor $1.25.

BIDS: Four bids were received, ranging from contract low of $874,742.50 to $1,126,313. Contract was awarded February 5, 1947.

LIST OF BIDDERS:

1. B. Perini & Sons, Inc., Framingham, Mass. (contract) $874,742.50
2. M. De Matteo Const. Co., Quincy, Mass. 915,616.30
3. Campanella & Cardi Const. Co., Hillsgrove, R. I. 1,056,124.00
4. V. Barletta Co., Roslindale, Mass. 1,126,313.00

	Item	Quantity	Unit Prices (1)	(2)	(3)
A2-5	Unclassified excavation	163,500 cy	$0.55	$0.63	$0.70
A3-2	Trench excavation	13,700 cy	1.40	1.55	1.50
A6-8a	Gravel borrow	597,000 tn	1.09	1.11	1.335
A6-8b	Compacting gravel borrow	613,000 sy	.011	.02	.02
A6-9	Sand borrow	400 tn	2.05	1.75	3.00
A6-10	Governors Island borrow	25,000 cy	.64	.70	.70
A13-1	Fine grad., roll. & fin.	56,000 sy	.07	.12	.05
B10-1	Calcium chloride for surf. tr.	20,000 lb	.03	.04	.03
B11-5	Bit. (tar) for surf. treatment	46,500 gal	.125	.125	.13
C5-1	Cl. A cem. conc. masonry	0.3 cy	100.00	100.00	200.00
C5-3	Cl. C. cem. conc. masonry	6 cy	75.00	50.00	50.00
C5-7	Steel reinf. for structures	150 lb	.10	.25	.20
C17-2	Rock fill	80 cy	8.00	6.00	6.00
D1-1	Catch basin	1 ea	175.00	200.00	160.00
D1-2	Manholes	2 ea	175.00	200.00	160.00
D3-1	C. basins or mhs., adj. to line and/or grade	2 ea	25.00	50.00	50.00
D3-3	Frames & grates or frames & covers, furn. & installed	2 ea	50.00	75.00	50.00
D4-3	36" extra strength reinf. conc. pipe	16 lf	8.00	10.00	12.00
D4-4a	12" asb. bonded asp. CCM pipe (16 gauge)	300 l	2.00	2.25	2.00
D4-4b	18" asb. bonded asp. CCM pipe (12 gauge)	150 lf	4.25	4.75	4.50
D4-4c	18" asb. bonded asp. CCM pipe (14 gauge)	140 lf	3.40	4.00	3.50
D4-4d	18" asb. bonded asp. CCM pipe (16 gauge)	390 lf	2.95	3.57	3.00
D4-4e	24" asb. bonded asp. CCM pipe (10 gauge)	160 lf	7.35	6.60	7.00
D4-4f	24" asb. bonded asp. CCM pipe (14 gauge)	470 lf	4.60	4.25	4.60
D4-4g	30" asb. bonded asp. CCM pipe (12 gauge)	300 lf	7.40	6.95	7.00
D4-4h	30" asb. bonded asp. CCM pipe (14 gauge)	260 lf	5.80	5.60	5.50
D4-4i	36" asb. bonded asp. CCM pipe (10 gauge)	760 lf	11.00	11.95	10.50
D4-4j	36" asb. bonded asp. CCM pipe (12 gauge)	4801f	8.80	9.25	8.50
D5-1	6" sub drains	25,300 lf	.95	.97	1.00
D6-1	36" pipe culverts rem. & relaid	100 lf	9.00	3.00	8.00
D10-1	Lumber platform	24 Mf bm	175.00	190.00	200.00
G15-1	2 bank wrought iron electrical & communication conduit	3,350 lf	3.60	3.66	2.75
G15-2	4 bank wrought iron electrical conduit	650 lf	7.20	7.32	5.50
G15-3	6 bank wrought iron electrical conduit	150 lf	10.80	10.98	8.25
G15-4	Timber bulkhead removed	250 lf	1.50	2.50	5.00
G15-5	Two mobile radio receiv. stations	lump sum	1,200.00	1,000.00	2,000.00
G15-6	Sub-drain lamp holes & covers	95 ea	15.00	15.00	20.00
G15-7	Days of rolling bit. treated gravel surfacing	7 ea	40.00	25.00	50.00
G15-8	Extra depth exc. (2 ft.-6 ft.)	4,000 cy	.55	1.00	1.00
G15-9	Extra depth exc. (6 ft.-10 ft.)	1,000 cy	.55	1.00	2.00
G15-10	Labor for soils investigation	500 hr	1.75	1.60	1.50
G15-11	Serv. of watering cart for laying dust	60 days	28.00	40.00	40.00
G15-12	Service of scarifier	80 hr	6.00	8.00	7.50

Baltimore Airport Runways, Md.

OWNER: City Aviation Commission, Baltimore, Maryland; C. R. Moore, Executive Director; Whitman, Requardt-Greiner Co. and Associates, Consultants.

Continued on next page

Built to Outperform

Exclusive features that save time and money by getting the job done better and quicker. "Plus values" built into every Austin-Western machine . . . values accumulated by engineering experience that has lived close to road building and earth moving problems since the first crude Austin-Western tools of 1859.

Whether you need . . .

√ The matchless performance of All-Wheel Drive and All-Wheel Steer in a Power Grader . . .

√ Vibrationless operation in a Road Roller . . .

√ The "no conveyor" feature in a Street Sweeper . . .

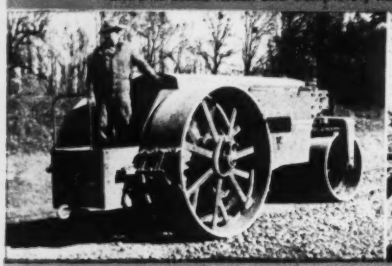
√ ¾-swing for greater work output in a Crawler Shovel . . .

√ Deeper jaws and higher operating speeds, for greater capacity in a Jaw Crusher . . .

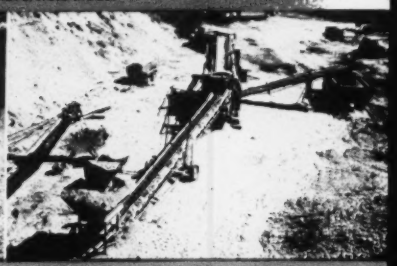
. . . whether it's one of these things, or something else, you can buy any Austin-Western product with confidence that it will OUTPERFORM in ways that mean more work, better work—faster and cheaper.

AUSTIN-WESTERN COMPANY, AURORA, ILL., U. S. A.

THE POWER GRADER THAT HAS EVERYTHING—No Motor Grader without All-Wheel Drive and All-Wheel Steer can hope to equal the all-around operating efficiency of the Austin-Western "99-H" Power Grader, with its High-Lift Blade, Extreme Blade Reach and Completely Reversible Blade.

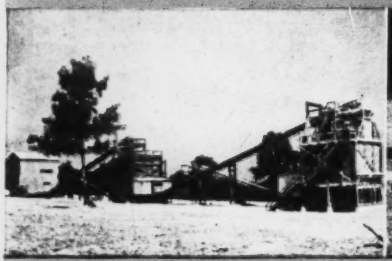


3-WHEELED ROLLERS—Made in sizes ranging from 6 to 12 tons. Gasoline or Diesel engines. Hydraulic power steer. Hydraulic scarifier attachment.



PORTABLE CRUSHING AND SCREENING PLANTS—Range in size from a mounted crusher to the magnificent Two-Unit and Three-Unit Plants. Illustrated is the new "101" with its jaw and roll crushers.

TANDEM ROLLERS—Made in 2 sizes—5 to 8-Ton and 8 to 10½-Ton. The variable weight feature enables one machine to handle a wide variety of jobs.



STATIONARY CRUSHING AND SCREENING PLANTS—Each, like this "agstone" and road rock plant, engineered especially for the job it has to do.

MODEL "40" SWEEPER—Compact, simplified, quick-dumping. May be had with right-hand or left-hand gutter broom, or both. Leaf Broom attachment also available.

BADGER SHOVEL—Convertible to crane, dragline, piledriver, trench hoe, and skimmer. ¾-swing design has many operating advantages.

BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859

Baltimore Airport Runways, Md.

Continued from preceding page

PROJECT: Construction of 3 runways and taxiways at the Baltimore Airport in Anne Arundel County, Maryland. Work involves 6,000,000 cu. yds. of excavation; clearing and drainage for 3 runways. One runway is to be 10,000 ft.; the two other runways, 8,000 ft.

CONDITIONS: Material to be moved mostly sand and gravel, no rock. Average haul to be about 2,300 ft. Top soil to be saved and used to cover finished grades. No materials will be furnished by the owner. Access to job site is available by both rail and highway. Stipulated contract time for completion is 300 calendar days. Skilled labor wage rates range from $1.375 to $2.25 per hr., and semi-skilled, from $1.05 to $1.25 per hr. Common wage rates are $.95 per hr.

BIDS: Eleven bids were received ranging from the contract low of $2,063,646.71 to $3,047,997.10. The contract awarded on May 1, 1947, was 28 percent below the engineer's estimate of $2,856,403.00.

LIST OF BIDDERS:

1. Langenfelder and Son, Baltimore, Md. (contract) $2,063,646.71
2. Hooper Construction Co., Montgomery, Ala. 2,372,151.50
3. Ralph Myers Contracting Corp., Salem, Ind. 2,619,274.10
4. Nello L. Teer Co., Durham, N. C. 2,625,059.35
5. Potashnick, O'Dell and Riney 2,647,529.70
6. Harrison Const. Co. and Mashuda Co. 2,742,613.20
7. Davis Const. Corp. 2,760,022.50
8. Groves and Sons, and Bowen and McLaughlin 2,850,690.65
9. Perini and Sons 2,898,263.40
10. McDougald Const. Co. 2,990,578.24
11. Winkelman Co. 3,047,997.10

	Item	Quantity	Engineer's Estimate	Unit Prices (1)	Unit Prices (2)
1	Clearing and grubbing	lump sum	$110,000.00	$86,250.00	$100,000.00
2	Unclassified excav.	5,914,000 cy	0.35	0.25	0.275
3	Concrete	4,500 cy	35.00	30.00	46.00
4	Reinforcing steel	270,000 cy	0.07	0.0725	0.095
5	Rein. concrete pipe*—24"	320 lf	6.35	9.70	6.00
6	Rein. concrete pipe*—27"	476 lf	7.75	11.26	7.25
7	Rein. concrete pipe*—30"	788 lf	9.00	11.07	9.00
8	Rein. concrete pipe*—33"	280 lf	10.75	14.26	12.00
9	Rein. concrete pipe*—36"	1,180 lf	11.40	12.67	12.25
10	Rein. concrete pipe*—42"	2,288 lf	15.15	15.36	14.75
11	Rein. concrete pipe*—48"	1,676 lf	17.30	20.09	20.00
12	Rein. concrete pipe*—54"	1,312 lf	20.40	20.43	21.00
13	Rein. concrete pipe*—60"	1,996 lf	23.75	25.11	25.50
14	Wood flumes, type "A"	1,821 lf	1.00	2.25	3.00
15	Wood flumes, type "B"	525 lf	0.75	2.50	4.50
16	Ditch checks	58 ea	7.50	50.00	30.00
17	Sanitary sewer—10" in place, including manholes	lump sum	7,200.00	8,429.40	9,000.00
18	Soil erosion control	130 a	600.00	442.00	550.00
19	Compaction	4,903,000 cy	0.05	0.018	0.03

* Estimates for reinforced concrete pipe include excavation.

Improvements at Toledo Municipal Airport, Ohio

OWNER: Department of Public Service, Toledo, Ohio; John H. Jewhurst, Director; C. L. Piper, City Engineer.

PROJECT: Improvements being constructed consist of 150 ft. x 750 ft. eight in. concrete apron, together with 50 ft. of 8 in. taxiway parallel, 25 ft. taxiways serving the Fixed Base operators, southeast of the landing apron, and the access roadways and parking areas. Also included in this contract is a sanitary sewer system consisting of wet well dosage chambers and filter beds and a 500 ft. deep, well water system. Drainage being constructed consists of an independent system of storm drainage outflow at the east side of field. Sub-surface drainage being constructed along edges of paved areas including roadways, apron and taxiways consists of 6 in. corrugated, perforated, asphalt dipped, steel pipe at an average depth of 2 ft. 7 in. placed 2 ft. outside of the edge of the paved areas. The concrete apron and taxiways are reinforced with 69 lb. reinforcing mesh. All joint material is of the thermoplastic type.

CONDITIONS: All materials to be furnished by the contractor. Access to job is available by rail and highway. Date for completion of the contract is November 15, 1947. The approximate wage rates are $2.25 per hr. for skilled labor; $1.625 per hr. for semi-skilled; $1.425 per hr. for common labor on buildings; and $1.20 per hr. for common labor on pavement.

BIDS: Three bids were received, ranging from $324,544.10 to $353,346.80. The contract was awarded July 7, 1947.

LIST OF BIDDERS:

1. Launder and Son, Toledo, Ohio (contract) $324,544.10
2. George Trombley and Sons, Toledo, Ohio 327,363.30
3. S. E. Johnson Co., Toledo, Ohio 353,346.80

	Item	Quantity	Unit Prices (1)	Unit Prices (2)	Unit Prices (3)
1	Excavation, unclassified	16,480 cy	$0.70	$0.90	$1.25
2	Granular material for sub-base	4,260 cy	3.80	4.50	6.60
3	150' Land. apron—8" reinf. conc. cl. "A"	12,477 sy	4.17	3.40	4.30
4	50' Taxiways—8" reinf. conc. class "A"	16,250 sy	4.17	3.40	4.30
5	25' Taxiways—7"-5"-7" reinf. conc. cl. "A"	960 sy	3.79	2.80	3.65
6	24' Entrance driveway 9"-6"-9" reinf. conc. class "D"	4,260 sy	3.62	3.15	3.85
7	20' Driveway 9"-6"-9" reinf. conc. class "D"	2,740 sy	3.62	3.20	3.
8	2½" Asphaltic conc. wearing surf. 25'—F.B.O. taxiways	375 cy	13.85	14.50	13.00
9	2½" Asphaltic conc. wearing surf. for auto parking space	476 cy	13.85	14.50	13.00
10	Water bound macadam base for F.B.O. taxiways and auto parking space—5"	1,680 cy	7.45	7.50	7.50
11	Conc. walks in front of Admin. Bldg. class "C"—6"	19,460 sf	.48	.40	.45
12	Conc. platforms at Admin. Bldg. class "C"—6"	1,980 sf	.48	.53	.45
13	Conc. curb at Admin. Bldg. class "D"—6" x 16"	240 lf	2.00	1.50	1.35
14	Chainlink fence incl. gates with steel posts set in conc.—48"	571 lf	2.12	2.10	2.40
15	Reinf. conc. sewer pipe or corr. iron pipe with paved invert—15"	400 lf	3.12	4.50	3.65
16	Plain conc. sewer pipe or corr. iron pipe with paved invert—15"	1,400 lf	1.98	3.15	2.50
1	Reinf. conc. sewer pipe or corr. iron pipe with paved invert—12"	1,060 lf	2.34	3.35	2.80
18	Plain conc. sewer pipe or corr. iron pipe with paved invert—12"	1,472 lf	1.62	2.50	1.90
19	Reinf. conc. sewer pipe or corr. iron pipe with paved invert—10"	910 f	2.10	3.10	2.35
20	Corr. met. perf. drain pipe—6"	14,140 lf	2.10	2.25	2.20
21	Special manhole (aver. depth 5.5')	32 ea	150.00	150.00	150.00
22	Elec. manhole (in 6' walk at apron)	5 ea	175.00	300.00	175.00
23	Special catch basin	22 ea	150.00	150.00	150.00
24	Metal underground ducts at landing apron—¾	1,060 lf	.98	1.25	.45
25	Underground ducts—2"	1,890 lf	1.04	1.50	.75
26	Underground ducts—3"	3,530 lf	1.12	1.60	1.10
27	Conc. post for apron light unit class "C"	10 ea	20.00	81.00	40.00
28	Conc. base for telephone gate station class "C"	5 ea	30.00	60.00	40.00
29	Sod-salvaged, stored and relaid	4,200 sy	5.0	3.00	.45
30	Tiedown in apron, type "A"	30 ea	3.00	15.00	10.00
31	Tiedown in apron, type "B"	24 ea	12.00	30.00	10.00
32	Water system installed complete	lump sum	18,117.00	17,750.00	20,148.70
33	Sanitary sewer system installed complete	lump sum	31,948.00	35,000.00	33,492.80
34	Adjust CB and MH to meet grade	10 lf	25.00	50.00	25.00

Airport Improvements, Georgia

OWNER: Muscogee County, Columbus, Georgia; Robert and Co., Assoc., Inc., engineers.

PROJECT: Complete construction of taxiways and extension of paved apron at existing airport. Work includes all clearing, grubbing, excavation and embankment construction, and excavation for sight line. Revisions to be made to existing storm drainage facilities and construction of new drainage facilities. Construction of base, bituminous pavement, turfing and reshaping certain areas.

CONDITIONS: All materials are to be furnished by the contractor. Access to job site is available by both rail and highway. Stipulated contract time is 120 working days. Prevailing skilled labor wage rate is $2.00 per hr., semi-skilled, $1.00 per hr.; and common, $.75 per hr.

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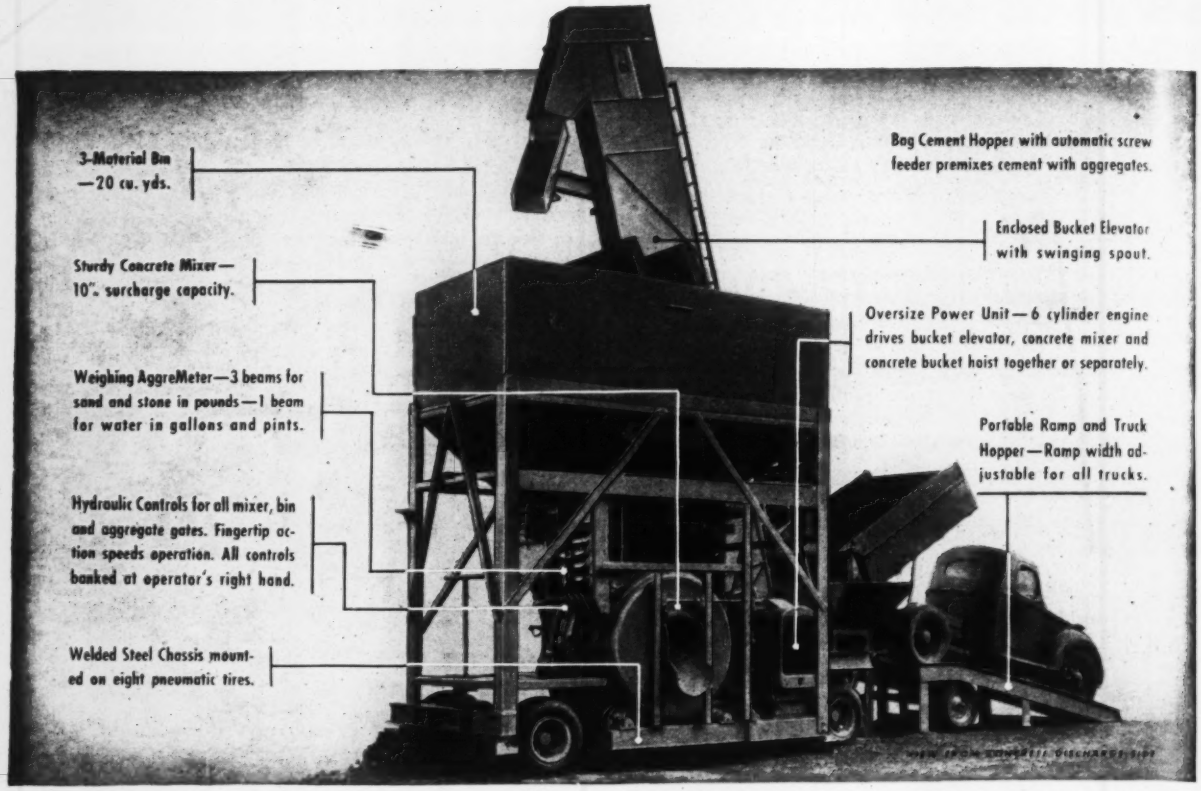
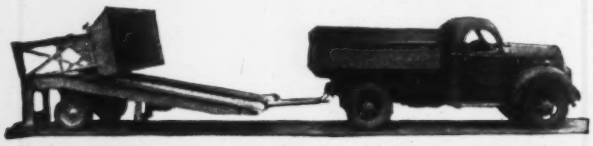
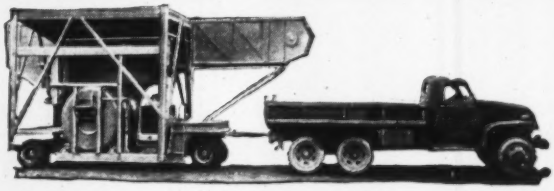

3-Material Bin —20 cu. yds.
Sturdy Concrete Mixer— 10". surcharge capacity.
Weighing AggreMeter—3 beams for sand and stone in pounds—1 beam for water in gallons and pints.
Hydraulic Controls for all mixer, bin and aggregate gates. Fingertip action speeds operation. All controls banked at operator's right hand.
Welded Steel Chassis mounted on eight pneumatic tires.
Bag Cement Hopper with automatic screw feeder premixes cement with aggregates.
Enclosed Bucket Elevator with swinging spout.
Oversize Power Unit—6 cylinder engine drives bucket elevator, concrete mixer and concrete bucket hoist together or separately.
Portable Ramp and Truck Hopper—Ramp width adjustable for all trucks.





Portable Concrete Plant *Moves from Job to Job*

BE prepared to make specifications concrete at 30 or 40 yards per hour wherever your jobs take you. The complete Strayer Portable Plant includes 20 yard Aggregate storage loaded by bucket elevator. A 4—beam AggreMeter weighs sand, aggregates and water. Bag Cement is premixed with aggregates before entering Concrete Mixer. Finger-touch hydraulic controls of all operations are banked at operator's right hand. New features make this original plant easier and faster to operate and to make ready for setup or moving. Write for new booklet describing the ¾ and 1 yd. plants and the new auxiliary concrete bucket hoist.

ERIE STEEL CONSTRUCTION COMPANY

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BUCKETS FOR THE JOB • ALSO AGGREMETERS

There's more payload less dead weight and greater strength in the new line of Erie Clamshells. The 2-rope Rehandler illustrated is available from stock in the correct size for your crane and job. Erie builds the most complete line of buckets offered by any manufacturer — Write for complete data on the bucket for your work.

ERIE GA PORTABLE AGGREMETER PLANTS standardized in 54- 78 or 102 Ton capacities use a specially designed 3-material weighing AggreMeter in 1, 1¼, 1½ and 2 cu. yard capacities. We are producing these plants in quantity and can make good delivery. Booklet GA-1 tells its story—Outline your requirements.

Airport Improvements, Georgia

Continued from preceding page

BIDS: Five bids were received, ranging from the contract low of $172,750.58 to $186,684.43. Contract was awarded September 26, 1947.

LIST OF BIDDERS:

1. Wright Contracting Co., Columbus, Ga. (contract) $172,750.58
2. Hugh McMath Const. Co., Columbus, Ga. 178,873.45
3. Hardaway Contracting Co., Columbus, Ga. 179,281.48
4. Mac Dougald Constr. Co., Atlanta, Ga. 185,674.30
5. Hewitt Contracting Co., Columbus, Ga. 186,684.43

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Clearing and grubbing—9 acres	lump sum	$4,000.00	$1,000.00	$1,000.00
2	Unclassified excavation	166,362 cy	.246	.23	.30
3	Reshaping	86,266 sy	.02	.03	.03
4	Storm drain—15"	1,030 lf	2.50	2.10	2.00
5	Storm drain—18"	950 lf	3.00	2.90	2.50
6	Storm drain—24"	2,396 lf	4.50	5.10	4.00
7	Storm drain—30"	2,550 lf	6.00	6.90	6.00
8	Storm drain—36"	1,508 lf	7.50	9.35	9.00
9	Storm drain—42"	650 lf	10.50	11.65	12.00
10	Corr. metal pipe (spillways)—10"	260 lf	2.00	1.75	1.50
11	Concrete for drainage structures	164 cy	70.00	60.00	60.00
12	Drop inlet frame & grate—Type I	25 ea	120.00	100.00	15.00
13	Drop inlet frame & grate—Type II	10 ea	220.00	190.00	30.00
14	Remove existing drop inlet	4 ea	25.00	35.00	20.00
15	Remove existing storm drain	140 lf	1.50	1.25	2.00
16	Remove existing headwalls	2 ea	25.00	25.00	10.00
17	Plain concrete (spillways)	13 cy	30.00	30.00	40.00
18	Riprap	15 sy	6.00	5.00	5.00
19	Subbase construction	6,950 cy	.49	.98	.90
20	Sand-clay base course—8"	11,640 cy	.63	.98	.90
21	Bituminous prime coat	17,475 gal	.19	.195	.18
22	Bituminous surface course—2"	4,993 ton	6.50	6.88	6.50
23	Bituminous seal coat	9,986 gal	.16	.15	.15
24	Cover aggregate for seal coat	349 ton	6.50	6.50	6.50
25	Turfing—areas "A"	87.5 ac	70.00	45.00	60.00
26	Turfing—areas "B"	14.7 ac	80.00	47.50	70.00
27	Mowing	87.5 ac	5.00	3.00	5.00
28	Refertilizing	20 ac	15.00	22.50	20.00

Paving at International Airport, Baltimore, Md.

OWNER: City of Baltimore, Md.; Whitman, Requardt-Greiner Co. and Associates, Baltimore, consulting engineers.

PROJECT: Paving and drainage at Friendship International Airport, Anne Arundel County, near Baltimore, Md. Work includes 21,000 ft. of paving three runways designed for 150,000 lb. wheel load. Excavation alone totals 401,150 cu. yds. Drainage includes laying 46,200 lin. ft. of pipe, ranging from 18 in. to 48 in. in diameter.

CONDITIONS: Owner will furnish sand and gravel on site (central plant mixed). Access to job site is available by highway and Pennsylvania Railroad. Contract time is 365 days. Stipulated minimum labor wage rates per hr. are: carpenters, $1.95; plumbers, $2.00; bricklayers, $2.25; cement finishers, $1.90; truck drivers, dump, $1.15 to $1.40; and concrete laborers, $1.10.

BIDS: Three bids were received, ranging from the contract low of $3,243,729.35 to $4,446,455.65. Contract was awarded March 10, 1948.

LIST OF BIDDERS:

1. Langenfelder & Son, Baltimore, Md. (contract) $3,243,729.35
2. Nello L. Teer, Durham, N. C. 3,420,939.40
3. B. Perini & Sons, Inc., Framingham, Mass. 4,446,455.65

	Item	Quantity	Unit Prices Engineer's Estimate	(1)	(2)
1	Clearing and grubbing	130 ac	$750.00	$200.00	$350.00
2	Class I excavation	305,000 cy	0.50	0.35	0.50
3	Class II excavation	85,500 cy	2.25	1.17	1.50
4	Class III excavation	10,650 cy	3.00	.60	0.50
5	Earth shoulders	658,200 sy	0.03	0.055	0.05
6	Gravel-refill	390 cy	4.00	6.11	3.00
7	Tile underdrains	6,200 lf	1.10	0.50	0.65
8	Supercompaction of subgrade	1,269,000 sy	0.034	0.03	0.03
9	Sheepsfoot compaction	1,269,000 sy	0.01	0.0625	0.015
10	Bituminous binder	58,310 ton	6.60	6.35	6.05
11	Bituminous surface	57,280 ton	6.85	6.10	6.25
12	Tack coat material	68,800 gal	0.1525	0.12	0.15
13	Bituminous mat'l. for seal coat	151,360 gal	0.1525	0.12	0.14
14	Aggregate for seal coat	3,440 ton	8.00	8.50	11.00
15	Waterbound macadam for roadways	16,440 sy	2.10	1.65	2.00
16	Bit. binder course for roadways	1,390 ton	6.60	6.35	6.05
17	Bit. surface course for roadways	1,370 ton	6.85	6.10	6.25
18	Removal of existing pavement	550 sy	1.50	1.00	1.00
19	Concrete (3500 p.s.i)	2,700 cy	50.00	55.50	65.00
20	Concrete (2500 p.s.i.)	500 cy	22.00	44.40	65.00
21	Reinforcing steel	233,460 lb	0.11	0.1138	0.10
22	Soil cement mixture	2,000 cy	8.00	11.60	10.50
23	Steel duct lines—4"	15,200 lf	1.45	1.84	1.70
24	Fiber or cement-asbestos duct lines—4"	28,200 lf	0.30	0.43	0.40
25	Concrete curb and gutter	5,900 lf	1.50	2.75	2.50
26	R.c.c.p.—18"	17,650 lf	3.70	3.06	2.90
27	R.c.c.p.—21"	5,700 lf	4.40	3.97	6.35
28	R.c.c.p.x.—24"	4,000 lf	6.00	4.78	4.35
29	R.c.c.p.x.—27"	5,950 lf	7.00	5.95	5.65
30	R.c.c.p.x.—30"	3,050 lf	8.00	6.86	6.70
31	R.c.c.p.x.—33"	950 lf	9.00	7.97	8.00
32	R.c.c.p.x.—36"	2,250 lf	11.00	8.60	8.70
33	R.c.c.p.x.—42"	100 lf	13.00	11.24	10.10
34	R.c.c.p.x.—48"	250 lf	17.00	12.85	14.35
35	C.m. pipe—15"	5,100 lf	2.50	10.16	3.60
36	C.m. pipe—18"	1,200 lf	3.00	10.55	3.50
37	End sections	102 ea	70.00	94.35	85.00
38	Subdrains	18,200 lf	1.75	0.75	1.00
39	Cast iron pipe—8"	2,750 lf	4.00	7.20	4.25
40	Cast iron pipe—12"	2,750 lf	5.00	10.42	6.95
41	Manholes	775 vf	30.00	33.30	19.50
42	Junction boxes, brick bends, types A, AA, and B, and special brick inlets	56 ea	250.00	499.50	200.00
43	Lining of existing inlets	32 ea	50.00	111.00	50.00
44	Type 'M' inlet frames and gratings	271 ea	75.00	47.73	70.00
45	Type 'N' inlet frames and gratings	19 ea	150.00	83.25	130.00
46	Type 'PA' inlet frames and gratings	5 ea	60.00	55.50	90.00
47	Cont. type inlet frames and gratings	766 lf	18.50	14.43	22.00
48	Sidewalk MH frames and covers	15 ea	25.00	27.75	40.00
49	Standard MH frames and covers	107 ea	35.00	41.07	53.00
50	Manhole steps	650 ea	0.90	1.22	4.00
51	Tie-down anchor rods	60 ea	3.00	31.91	14.00
52	Riprap	500 sy	3.50	9.44	6.00
53	Seeding, mulching, and top-soiling	300 ac	500.00	425.00	500.00
54	Seeding, mulching undisturbed areas	50 ac	400.00	200.00	150.00
55	Sodding	3,900 sy	5.00	0.75	1.30
56	Furnishing and installing compass compensator	1 ea	150.00	1,000.00	900.00
57	Furnishing and laying galvanized steel pipe—4"	3,800 lf	1.45	2.70	2.00
58	Furnishing and installing ground cable	3,000 lf	0.10	0.26	0.30
59	Furnishing and laying cast iron soil pipe—4"	3,250 lf	1.00	2.92	1.30
60a	Sand-bituminous base course (central plant mixed)	250,450 ton	4.95	4.00	4.50
60b	Selected material base course	240,625 cy	1.13	0.70	0.92

Elevated Highway, Washington, D. C.

OWNER: District Commissioners; C. R. Whyte, Engineer of Bridges; H. C. Whitehurst, Director of Highways.

PROJECT: Construction of an elevated highway located on K Street, N. W., Washington, D. C. The Standard cross-section will provide for 2 roadways, each 22 ft. 9 in. wide with a dividing strip 2 ft. 6 in. and carried across the Chesapeake and Ohio Canal on a two span reinforced concrete girder structure. High level roadways 23 ft. wide are to be brought together after passing over Rock Creek to give the Standard cross-section. Roadways will consist of retaining walls, rigid frame structures, and continuous girder spans all of reinforced concrete and faced with masonry on the exterior faces. A concrete abutment will be of steel girder and column construction with concrete deck and pipe railings and concrete foundations supported in part on concrete piles and in part on rock. The easterly ramp will comprise 7 spans of reinforced concrete girders, columns and foundations; the westerly ramp, a 2-span reinforced concrete girder structure.

CONDITIONS: All materials are to be furnished by the contractor. Access to job site is available by rail and highway. Contract time is 540 calendar days. Skilled labor wage rates range from $2.125 to $2.25 per hour; semi-skilled, from $1.35 to $1.875 per hour; and common from $.50 to $1.25 per hour.

BIDS: Two bids were received, the contract low of $3,294,392 and $3,647,764. Contract was awarded April 11, 1947.

Continued on next page

Elevated Highway, Washington, D. C.

Continued from preceding page

LIST OF BIDDERS:

1. Alexander and Repass, Des Moines, Iowa (cont.) $3,294,392
2. Charles H. Tompkins Co., Washington, D. C. 3,647,764

	Item	Quantity	Unit Prices (1)	(2)
1	Removal of existing structures	lump sum	$16,000.00	$60,000.00
2	Borings	1,150 lf	14.00	3.50
3	Excavation, sheeting, etc.	17,350 cy	9.00	35.00
4	Fill, roadway and embankment	7,200 cy	4.50	2.00
5	Concrete piles and load tests	32,600 lf	6.00	6.00
6	Alterations to Key Bridge	lump sum	12,000.00	40,000.00
7	Removal, parts of Key Bridge	lump sum	11,000.00	35,000.00
8	Stone masonry	lump sum	180,000.00	150,000.00
9	Dry stone walls and footings	33 cy	30.00	40.00
10	Curb on ground	90 cy	45.00	70.00
11	Sidewalk on ground	175 sy	4.00	3.00
12	Reinforced concrete pavement on ground	2,050 sy	4.00	5.00
13	Concrete in place in frames, girder spans, walls	3,840 cy	51.00	50.00
14	Concrete in place, foundations	1,200 cy	36.00	40.00
15	Concrete in place, easterly approach, Key Bridge	1,850 cy	51.00	70.00
16	Concrete in place, southwest abutment, bridges over canal	6,238 cy	54.00	50.00
17	Concrete on deck	5,950 cy	52.00	65.00
18	Reinforcing steel	2,446,000 lb	.09	.09
19	Miscellaneous metalwork	37,100 lb	.50	.24
20	Structural metalwork	10,320,000 lb	.13	.11
21	Drains, complete	lump sum	21,000.00	30,000.00
22	Metal parapet railings	7,320 lf	11.00	10.00
23	Lighting system	lump sum	45,000.00	30,000.00
24	Dampproofing	1,500 sy	2.50	1.00
25	Painting deck and wall	lump sum	5,000.00	10,000.00

Macadam Surfaced Road, Pa.

OWNER: State Highway Department, Harrisburg, Pennsylvania; E. L. Schmidt, Chief Engineer.

PROJECT: Improvement of 8.24 miles of highway on routes 370 and 247 in Wayne County, Pennsylvania. Road to be surfaced with macadam pavement. The channel of Shehawken Creek will be changed at several places to protect the highway. Construction of one new concrete bridge with span of 34 ft. and 32 ft. wide.

CONDITIONS: All materials to be furnished by contractor. Contract time is 125 working days. Access to job is available by rail and highway. Skilled wage rate is $1.50 per hr.; semi-skilled, $1.25 per hr.; and common, $.90 per hr.

BIDS: Two bids were received, the contract low of $760,937.70 and $781,833.66. Contract was awarded April 10, 1947.

LIST OF BIDDERS:

1. A. W. Hinaman and John Kaminski, Williamsport, Pa. (contract) $760,937.70
2. Collins and Maxwell, Easton, Pa. 781,833.66

	Item	Quantity	Unit Prices (1)	(2)
1	Clearing and grubbing	lump sum	$15,000.00	$20,000.00
2	Excav.—Cl. 1	149,019 cy	1.10	1.20
3	Excav.—Cl. 2	6,247 cy	5.00	4.00
4	Borrow excav.	1,707 cy	1.10	.50
6	Subgrade	105,600 sy	.30	.22
8	Shoulders	45,220 lf	.30	.25
9	Sub-base	500 cy	8.00	4.50
11	Nat. stone, type "A" or cr. agg. bs. crse. 10" deep	99,731 sy	2.50	2.71
12	Nat. stone, type "B" or cr. agg. bs. crse. 8" deep	7,369 sy	2.00	2.10
17	Calcium chloride	3 tons	60.00	50.00
23	Plain cmt. concr. wear. surf. for bldg. floor	136 sy	4.00	4.00
27	Bit. surf. crse., DP-1, 3" deep	103,375 sy	1.25	1.25
28	Concrete—Cl. "A"	75 cy	50.00	45.00
28a	Concrete—Cl. "AA"	4 cy	110.00	100.00
29	Concrete—Cl. "B"	507 cy	45.00	40.00
30	Plain steel bars	32,670 lb	.10	.10
35	Stone backfill for struct.	102 cy	8.00	4.00
35a	Stone backfill for misc. drainage	3 cy	4.00	5.00
42	Cmt. rubble masonry	202 cy	25.00	35.00
53	Grouted rubble pav. for stream beds	186 cy	18.00	35.00
56	Inlets—type "H"	7 ea.	250.00	200.00
56a	Inlets—type "E"	2 ea	150.00	175.00
61	Corr. metal pipe, 18"	50 lf	4.00	4.50
62	Asph. coat. corr. metal pipe, 15"	56 lf	4.00	4.50
62a	Asph. coat. corr. metal pipe, 18"	226 lf	4.50	5.00
62b	Asph. coat. corr. metal pipe, 30"	182 lf	11.00	10.00
62c	Asph. coat. corr. metal pipe, 36"	270 lf	15.00	15.00
62d	Asph. coat. corr. metal pipe, 48"	180 lf	20.00	21.00
65	Reinf. cmt. concr. pipe, 15"	3,452 lf	4.75	4.00
65a	Reinf. cmt. concr. pipe, 18"	1,674 lf	5.00	4.75
65b	Reinf. cmt. concr. pipe, 24"	38 lf	8.00	7.50
65c	Reinf. cmt. concr. pipe, 72"	56 lf	40.00	23.00
67	Corr. metal pipe, relaid, 12"	36 lf	1.50	2.00
67a	Corr. metal pipe, relaid, 15"	316 lf	2.00	3.00
67b	Corr. metal pipe, relaid, 18"	18 lf	2.20	3.50
68	Stone fdtn. under drain, type "B"	300 lf	1.40	.80
69	Tile, 6", under drain, type I backfill	1,125 lf	1.40	1.60
69a	Tile, 6", under drain, type II backfill	5,273 lf	1.35	1.60
70	Tile, 6", fdtn. under drain, type "B"	110 lf	1.35	1.70
71	Tile outlets, 6"	500 lf	1.35	1.30
75	Subgrade drains	6,500 lf	.75	.60
92	Guard fence—1B, 2B, 3B or 4B	2,048 lf	1.15	1.25
92a	Guard fence—1-C	4,976 lf	1.00	1.15
93	Guard posts	126 ea	9.00	5.00
94	End anchorage—type 1, 2, 3 or 4	6 ea	50.00	50.00
94a	End anchorage—type C	31 ea	45.00	50.00

Highway, Worthington, Minnesota

OWNER: State Highway Department, St. Paul, Minnesota; O. L. Kipp, Chief Engineer.

PROJECT: Grading, shouldering and paving 12.4 miles of highway between Bigelow and Trunk Highway 16 in Worthington, and between North corporate limits of Worthington to 0.7 mile east of Worthington on Trunk Highway 16.

CONDITIONS: All materials to be furnished by contractor. Access to job site is available by rail, highway, and water. Skilled labor wage rates range from $1.10 to $1.75 per hr.; semi-skilled, from $.80 to $1.55 per hr.; common, from $.70 to $.90 per hr.

BIDS: Five bids were received, ranging from the contract low of $569,182.91 to $619,605.22. The contract was awarded on March 20, 1947.

LIST OF BIDDERS:

1. Anderson and Sons, Inc., Minneapolis, Minn. (contract) $569,182.91
2. Okes Const. Co., St. Paul, Minn. 588,100.35
3. Woodrich Const. Co., Inc., Minneapolis, Minn. 602,248.49
4. Hallett Const. Co., Crosby, Minn. 604,943.62
5. Western Const. Corp., Sioux City, Iowa 619,605.22

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Clearing	64 tree	$5.00	$5.00	$7.50
2	Grubbing	64 tree	5.00	10.00	5.25
3	Removing portable culverts	1,512 lf	.50	.75	.53
4	Removing curb and gutter	20 lf	.50	.50	.50
5	Removing sidewalks	45 sy	.30	.40	.25
6	Obliterating old roadway	5 a	35.00	120.00	55.00
7	Class "C" excavation	196,617 cy	.31	.27	.34
8	Topsoil covering in place	1,436 cy	1.30	1.30	1.10
9	Hand ditch excavation	15 cy	3.00	2.00	2.00
10	Sand gravel fill in place (box culvert)	274 cy	1.35	1.00	1.50
11	Sand gravel fill in place (subgrade corr.)	6,442 cy	.95	1.00	1.50
12	Excavation of earth mat'l	5,961 cy	.28	.50	.37
13	Haul of earth mat'l	6,073 cy mi	.20	.30	.15
14	Water	296 M gal	3.00	4.00	4.00
15	Exc. of unsuitable mat'l	2,381 cy	.50	.75	.34
16	Salv. bit. mixt. in pl. (tr. meas.)	14,642 cy	1.45	1.60	2.00
17	Relaying 18" S. C. culv.	62 lf	1.10	1.00	.80
18	Relaying 24" S. C. culv.	66 lf	1.20	1.50	1.00
19	Relaying 36" S. C. culv.	78 lf	1.60	2.50	1.50
20	Relaying 15" C. M. culv.	122 lf	.60	1.00	.50
21	Relaying 18" C. M. culv.	316 lf	.75	1.00	.60
22	Conc. headwalls (grade "A")	5 cy	40.00	50.00	40.00
24	Removal of old structures (W 46 x 39) sta. 250+75	lump sum	250.00	300.00	100.00
25	Trench excav. 0' to 6' deep (subsurface drains)	245 lf	1.25	2.00	1.00
27	Random riprap (culvert ends)	25 cy	8.00	10.00	10.00
28	Trench excav. 0' to 6' deep (pipe sewers)	911 lf	1.50	2.00	.75
30	Exc. for manholes or catch basins	134 cy	1.75	2.00	1.50
31	Constructing manholes	17 cy	45.00	52.00	40.00
32	Constructing catch basins	14 cy	35.00	52.00	40.00
33	F. and I. casting assemblies	17 ea.	50.00	55.00	62.00
34	Adjusting frame or ring castings	1 ea.	12.00	10.00	7.00
35	Conc. sidewalk (4" thick)	288 sf	.30	.40	.23
36	Conc. sidewalk (6" thick)	48 sf.	.50	.60	.27
37	Conc. eros. cont. structures (cattle pass ramps)	15 cy	30.00	52.00	25.00
39	Project markers	10 ea	10.00	15.00	8.00
40	Roadside seeding	85 a	15.00	12.00	15.00
41	Area sodding	26,108 sy	.33	.40	.32

Continued on next page

Highway, Worthington, Minnesota

Continued from preceding page

45	F. and I. 15" S. C. culv.	170 lf	2.75	2.50	2.20
46	F. and I. 18" S. C. culv.	8 lf	3.00	3.00	2.70
47	F. and I. 24" S. C. culv.	488 lf	4.30	4.00	4.10
48	F. and I. 30" S. C. culv.	96 lf	6.40	6.50	6.00
49	F. and I. 36" S. C. culv.	298 lf	7.60	9.00	7.50
50	F. and I. 12" reinforced concrete sewer pipe	263 lf	2.20	2.00	1.90
51	F. and I. 18" reinforced concrete sewer pipe	85 lf	2.80	3.00	2.50
52	F. and I. 24" reinforced concrete sewer pipe	503 lf	4.60	4.00	3.90
53	F. and I. 12" C. M. culv.	32 lf	2.00	2.00	1.60
54	F. and I. 15" C. M. culv.	194 lf	2.30	2.25	2.10
55	F. and I. 18" C. M. culv.	348 lf	2.50	2.50	2.40
56	F. and I. 24" C. M. culv.	54 lf	4.00	4.00	3.75
57	F. and I. 48" C. M. culv.	32 lf	10.80	12.00	10.00
58	F. and I. 18" C. M. pipe	40 lf	2.35	3.00	2.10
59	F. and I. 12" non-perf. metal pipe	245 lf	1.70	2.00	1.80
60	F. and I. met. apr. for 12" C. M. culv.	2 apron	22.00	12.00	13.60
61	F. and I. met. apr. for 15" C. M. culv.	21 apron	22.00	15.00	14.70
62	F. and I. met. apr. for 18" C. M. culv.	30 apron	30.00	16.00	17.50
63	F. and I. met. apr. for 24" C. M. culv.	4 apron	60.00	30.00	29.00
64	F. and I. mat. apr. for 48" C. M. culv.	2 apron	145.00	140.00	125.00
65	Preparation of the subgrade	2,683 cy	1.00	.90	1.00
66	Temporary crossings	11 ea.	50.00	60.00	70.00
67	Integrant curb, type "A" des. A3	166 lf	.20	.30	.25
68	Integrant curb, type "B" des. B10	166 lf	.80	1.00	.25
69	Conc. curb, type "D" des. C9	1,965 lf	.85	1.50	.50
70	Concrete curb and gutter, type "F" des. A 626	2,235 lf	1.40	2.35	1.50
72	Grav. base in place (tr. meas.)	1,036 cy	2.50	1.50	2.25
73	Water	5 M gal	3.00	4.00	4.00
74	Bit. mat'l for prime coat	4,894 gal	.20	.14	.20
75	Bit. mat'l for mixture	7,830 gal	.18	.14	.20
76	Aggregate	489 ton	2.25	2.00	2.00
77	Bituminous surface	4,894 sy	.20	.10	.15
78	One course conc. pave. (air entraining cement)	175,227 sy	2.41	2.50	2.52
79	Class "U" excavation	131 cy	2.00	2.50	2.00
80	Grade "A" concrete	48 cy	50.00	50.00	40.00
81	Reinforcement bars	5,214 lb	.10	.10	.12
82	Exc. for S. C. cattle pass	197 cy	1.00	2.50	.63
83	S. C. cattle pass	110 lf	20.50	25.00	21.00

Highway Improvement, New Hampshire

OWNER: Highway Department, New Hampshire; Robert W. Whitaker, Construction Engineer; Earl Davis, Resident Engineer.

PROJECT: Construction of 3.269 miles of a 21 ft. pavement. Road is to be gravel surfaced. A gravel overhaul cost of $12,200 is added to the job since the nearest largest supply of gravel is a commercial pit 7 miles from the project.

CONDITIONS: Owner will furnish all reinforced concrete pipe to be delivered to the project by the State of New Hampshire. Contractor, however, is to lay the pipe. Access to job is available by rail and highway. Contract time is 80 working days. Skilled labor wage rates range from $1.25 to $1.90 per hr. and semi-skilled from $1.05 to $1.50. Common labor rate is $1.00 per hr.

BIDS: Four bids were received, ranging from the contract low of $115,699 to $128,912. The contract was awarded on June 18, 1947.

LIST OF BIDDERS:

1. Landers and Griffin, Inc., Portsmouth, N. H. (contract) — $115,699.00
2. Weaver Bros. Const. Co., Inc., Concord, N. H — $120,649.00
3. Manchester Sand, Gravel and Cement Co., Inc., Manchester, N. H — $122,750.40
4. Thibodeau Const. Co., Wolfeboro, N. H — $128,912.00

	Item	Quantity	Unit Prices (1)	(3)	(3)
1	Clearing and grubbing	8 a	400.00	400.00	500.00
2	Removing trees	153 ea	25.00	25.00	30.00
3	Removing aban. road surface	2,500 sy	.20	.20	.25
5.1	Earth excavation	33,600 cy	.80	.85	.80
6.1	Earth trench excavation R	2,000 cy	1.50	2.00	2.00
6.2	Ledge trench excavation R	50 cy	5.00	5.00	5.00
11.1	Earth borrow	14,600 cy	.75	.75	.80
14.1A	Gravel borrow bridge	600 cy	1.00	1.25	.85
14.1	Gravel borrow	8,300 cy	.85	.85	.85
14.2	Gravel overhaul	122,000 cym	.10	.10	.10
15	Fine grading	113,000 sy	.08	.10	.10
16	Gravel borrow base course	11,200 cy	.90	.85	.85
19.1	Gravel surface course	4,300 cy	1.25	1.25	1.30
20	Class A bit. surf. treatment	28,000 gal	.20	.20	.20
38.4	Mortar rubble masonry	42 cy	20.00	20.00	25.00
40.11-A	Laying 12" R. C. pipe	2,200 lf	1.10	1.10	1.00
40.11-B	Laying 15" R. C. pipe	656 lf	1.25	1.25	1.25
40.11-C	Laying 18" R. C. pipe	64 lf	1.50	1.50	1.60
40.11-D	Laying 48" R. C. pipe	100 lf	5.00	5.00	6.00
60.1	Cable guard rail (wood posts)	400 lf	.75	.75	1.00
61	Anchorages	6 ea	20.00	20.00	20.00
63.1	Wood post markers	50 ea	3.00	3.00	2.00
64.1	Catch basins type A	9 ea	150.00	150.00	140.00
64.3	Catch basins type C	11 ea	150.00	150.00	160.00
64.7	Manholes	5 ea	150.00	200.00	160.00
66	Gran te curb inlets A	2 ea	25.00	25.00	25.00
67	Traps	6 ea	25.00	20.00	30.00
74	Stock wire fence	2,000 lf	.35	.35	.50
79	Mantenance of traffic	15,500 lf	.20	.20	.22
80	Loam 4" deep	5,000 sy	.35	.35	.50
81	Sod	400 sy	1.50	2.00	2.00
82	Fertilizer for grasses	1,350 lb	.10	.10	.10
83	Grass seed	113 lb	1.00	1.00	1.00
90	Dust laying	15,500 lf	.10	.10	.10

Gravel Base Road, West Memphis, Ark.

OWNER: Arkansas State Highway Commission, Little Rock, Arkansas; W. W. Zass, Engineer.

PROJECT: Construction of approximately 4.760 miles of grading, minor drainage structures and gravel base course on the West Memphis—Marion Road in Crittenden County, Arkansas. The proposed project begins approximately ¼ mile north of the junction of Highways No. 61 and 70 at West Memphis and extends along present Highway No. 61 to the junction of Highways No. 61 and 64 at Marion.

CONDITIONS: All materials are to be furnished by the contractor. Access to job is available by Missouri Pacific Railway, Highway 70 and Mississippi River. Stipulated contract time is 90 working days. Specified wage rates are $1.00 per hr. for skilled labor; $.72 per hr. for semi-skilled; and $.62 per hr. for common.

BIDS: Six bids were received, ranging from $47,995.98 to $60,281.14 Contract was awarded June 6, 1947.

LIST OF BIDDERS:

1. D. F. Jones Const. Co., Little Rock, Ark. (contract) — $47,995.98
2. J. P. McNulty, Pine Bluff, Ark. — 49,355.44
3. Campbell Const. Co., Inc., Little Rock, Ark — 51,161.10
4. Graves Bros., Hamburg, Ark. — 52,341.94
5. Mears Const. Co., Osceola, Ark. — 54,829.04
6. Linwood Smith, Lake Village, Ark. — 60,281.14

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Common excavation	14,021 cy	$0.50	$0.30	$0.40
2	Dry excavation	214 cy	3.00	4.00	2.25
3	Overhaul	16,527 sta. yd.	.02	.02	.02
4	Fence moved and reconstructed	64 rods	1.00	2.00	1.25
5	Selected material	11,805 cy	1.10	1.00	1.30
6	Gravel base course class B2	9,222 cy	2.47	3.00	2.68
7	Class B concrete	13.82 cy	45.00	60.00	50.00
8	Reinforcing steel	382 lb	.10	.20	.10
9	Corr. metal pipe culv.—18"	180 lf	2.75	3.00	2.80
10	Corr. metal pipe culv.—24"	440 lf	4.00	4.00	4.50
11	Corr. metal pipe culv.—30"	120 lf	5.50	4.65	6.00
12	Reinforced conc. pipe culv.—18"	24 lf	3.00	4.25	4.50
13	Reinforced conc. pipe culv.—36"	40 lf	7.50	6.50	8.00
14	Relayng culvert pipe	119 lf	2.00	2.00	2.00

Reinforced Concrete Road, Lawrence County, Indiana

OWNER: State Highway Commission, Indianapolis, Indiana; C. E. Vogelsang, Engineer.

PROJECT: Improvement of 2.907 miles of highway in Lawrence County, Indiana, from E. Fork of White River to 16th and M Sts. in Bedford, Indiana. Road to be surfaced

Continued on next page

Local Engines Make Good

WAUKESHA ENGINES

● With the "home town folks" there's no distance to lend enchantment. They know what you make, and how you make it. If they use what you make, like what it does for them and how it does it . . . and say so . . . you've got something!

When Mr. E. J. Stephan and Mr. Grover Dobbertin tell you, "For many years Waukesha County has been purchasing road equipment powered with Waukesha Motors" and speak of Waukeshas' "fine performance" it *is* significant. They are the Highway Commissioner and the Chairman of the Highway Committee of Waukesha County.

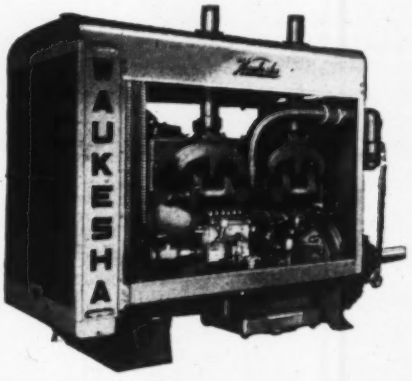
They go on to say: "Most of our large maintenance trucks are equipped with your motors as well as a large power shovel and air compressor. These units have given us very satisfactory results.

"Just recently we purchased one of your LARGE DIESEL POWER UNITS for our new crushing plant and it is proving out far beyond our expectations. One short day we crushed over 600 yds. of gravel, which is about double the production of the unit owned and operated by Waukesha County previous to the installation of the Waukesha Motor Company Diesel . . . The service that you render when needed is superb."

The Diesel unit referred to is the Waukesha Super Duty Diesel. Mounted on its own trailer it is a general utility rig and may be used for any number of applications.

Consult Waukesha engineers on all your power problems. Send for Bulletin 1418.

SUPER DUTY DIESEL Model 6-WAKDU POWER UNIT six cyl., 6¼ in. bore x 6½ in. stroke, 1197 cu. in. displ., 190 hp. max. rating at 1300 rpm.



WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES

Reinforced Concrete Road, Lawrence County, Indiana

Continued from preceding page

with reinforced concrete.

CONDITIONS: Access to job site is available by highway only. All materials are to be furnished by contractor. Stipulated contract time is 250 days from the contract award date. Skilled labor wage rate is $1.05 per hr.; semi-skilled, $0.95 per hr.; and common, $0.90 per hr.

BIDS: Only one bid was received, amounting to $613,196.52, or 2½ percent below the engineer's estimate of $629,078.61. Contract was awarded August 13, 1947 to the bidder, the Calumet Paving Co. of Indianapolis, Indiana.

	Item	Quantity	Unit Prices: Engineer's Estimate	(1)
1	Excavation, common	160,091 cy	$0.43	$0.78
2	Excavation, special borrow	6,310 cy	.55	.78
3	Special borrow, grade "B"	3,708 cy	2.00	2.50
4	Excavation, solid rock	115,226 cy	1.35	.78
5	Overhaul	81,749 cy	.09	.80
6	Added haul	3,897 ea	.06	.60
7	Pavement removal	5,499 sy	.60	.50
8	Salvaged pavement removal	1,044 sy	.65	.70
9	Sidewalk removal	859 sy	.55	.25
10	Retaining wall removal	257 lf	1.00	.25
11	Curb removal	3,277 lf	.45	.25
12	Curb & gutter removal	797 lf	.60	.25
13	Salvaged stone retaining wall removal	252 sy	1.00	.25
14	Guard rail removal	1,941 lf	.50	.25
15	Finishing shoulders & ditches	14,690 lf	.32	.50
16	RC, VC, or Cl pipe—30 in.	364 lf	5.90	6.50
17	RC, VC, Cl or concr. pipe—12 in.	333 lf	2.20	2.00
18	RC, VC, Cl or concr. pipe—15 in.	321 lf	2.40	2.50
19	RC, VC, Cl or concr. pipe—18 in.	189 lf	2.90	3.00
20	RC, VC, Cl or concr pipe—24 in.	351 lf	4.10	5.00
21	VC, Cl or concr. pipe—24 in.	177 lf	4.10	5.00
22	RC, VC, Cl, concr. or bit. coated CM pipe—12 in.	46 lf	2.20	2.00
23	RC, VC, Cl, concr. or bit. coated CM pipe—18 in.	24 lf	2.90	3.00
24	RC, VC, Cl, concr. or bit. coated CM pipe—30 in.	18 lf	5.90	7.00
25	Sewer pipe—4 in.	100 lf	1.20	1.50
26	Sewer pipe—6 in.	538 lf	1.30	1.50
27	Sewer pipe—8 in.	200 lf	1.45	1.75
28	Sewer pipe—10 in.	200 lf	1.75	2.00
29	Drain tile, vit. clay tile or cmt. concr. tile—6 in.	100 lf	1.20	1.20
30	Drain tile, vit. clay tile or cmt. concr. tile—8 in.	100 lf	1.35	1.40
31	Drain tile, vit. clay tile or cmt. concr. tile—10 in.	100 lf	1.60	1.60
32	Bit. coated CM pipe—12 in.	246 lf	2.45	2.00
33	Bit. coated CM pipe—15 in.	308 lf	2.80	2.50
34	Bit. coated CM pipe—18 in.	38 lf	3.35	3.00
35	Extra strength RC or Cl—30 in.	160 lf	6.95	8.00
36	Standard strength RC or Cl pipe—15 in.	51 lf	2.80	2.50
37	Standard strength RC or Cl pipe—18 in.	168 lf	3.50	3.00
38	RC, VC, Cl, conc. pipe (bell & spigot joints)—12"	1,548 lf	3.60	2.00
39	RC, VC, Cl, conc. pipe (bell & spigot joints)—15"	207 lf	4.00	2.50
40	RC, VC, Cl, conc. pipe (bell & spigot joints)—18"	486 lf	6.50	3.00
41	RC, VC, Cl, conc. pipe (bell & spigot joints)—24"	332 lf	7.75	5.00
42	Bit. coated perf. CM pipe for subsurface drains—6"	90 lf	1.25	1.20
43	Bit. coated perf. CM, VC sewer, cmt. concr. sewer of perf. VC sewer pipe for subsurface drains—6 in.	510 lf	1.25	1.20
44	Aggregate for subsurface drains	90 cy	4.00	5.00
45	Catch basins, type A-3	14 ea	210.00	250.00
46	Catch basins, type A-2	1 ea	190.00	250.00
47	Catch basins, type C-5	1 ea	135.00	250.00
48	Catch basins, type C-5 (with hood)	1 ea	160.00	300.00
49	Pipe catch basins—18 in.	2 ea	60.00	100.00
50	Inlets, type A-3	7 ea	100.00	125.00
51	Inlets, type C-5	1 ea	85.00	125.00
52	Manholes, type A-4	1 ea	250.00	250.00
53	Manholes, type B-4	11 ea	230.00	250.00
54	Type "4" casting & adjust to grade	7 ea	80.00	25.00
55	Spring box	1 ea	75.00	125.00
56	Concr. for structures class "D"	925.6 cy	47.00	50.00
57	Concr. for structures special class "D"	89.7 cy	60.00	60.00
58	Reinforcing steel for structures	274,955 lb	.09	.09
59	Reinforced concr. pavement	51,784 sy	3.02	2.95
60	Private drive pavement	415 sy	3.60	3.20
61	Reinforcing steel for pavement	1.112 lb	.09	.10
62	Traffic lane stripe—6 in.	2.883 mi	350.00	400.00
63	Intermittent traffic lane stripe—4 in.	0.514 mi	325.00	400.00
64	Concr. header	14 lf	2.75	3.00
65	Grade "C" spl. borrow for subgrade treatment	12,608 cy	1.75	2.00
66	Expan. joint 1" cork, rubber or fiber	153 lf	.65	0.50
67	Expan. joint 1" preformed with load transfer	211 lf	.90	.90
68	Expan. joint 1" preformed	402 lf	.65	.50
69	Expan. joint ½" preformed	174 lf	.60	.50
70	Contraction joints, type D1, D4, D5	11,942 lf	.60	.70
71	Bit. stabilized mixture, type "A"	1,344 tons	8.00	7.00
72	Bit. stabilized mixture, type "B"	1,294 tons	7.75	7.00
73	Aggregate for compacted aggregate surface	800 tons	3.75	3.50
74	Furnishing seed & fertilizer for plain seeding	4.08 ac	40.00	40.00
75	Plain seeding	4.08 ac	35.00	40.00
76	Mulched seeding	111,974 sy	.09	.08
77	Sodding	14,272 sy	.40	.30
78	Sodding shoulders	15,376 sy	.38	.30
79	Flexible steel plate guard rail	152 lf	2.50	3.00
80	Guide posts, type "A"	73 ea	2.75	3.00
81	Barricades, type "A"	2 ea	70.00	25.00
82	Barricades, type "B"	6 ea	60.00	75.00
83	Prewarning signs	8 ea	50.00	60.00
84	Signs, X 10-R	2 ea	60.00	60.00
85	Signs, X-13	12 ea	50.00	60.00
86	Paved side ditch type "A"	3,289 lf	1.75	1.80
87	Paved side ditch, type "B"	481 lf	2.25	2.00
88	Paved side ditch, type "C"	330 lf	2.80	2.50
89	Paved side ditch type "D"	537 lf	2.80	3.00
90	Paved side ditch, type "E"	338 lf	3.85	3.50
91	Paved side ditch, type "G"	950 lf	4.85	5.00
92	Integral concr. curb	5,616 lf	1.50	1.40
93	Riprap	660 sy	4.50	4.00
94	Salvaged stone riprap	50 sy	3.50	4.00
95	Bench mark post	1 ea	20.00	25.00
96	Sidewalk	498 sy	3.25	2.00
97	Crosswalk class "B"	9 sy	3.60	3.00
98	Maintaining traffic	lump sum	1,500.00	1,000.00

Cement Concrete Pavement, Baton Rouge, La.

OWNER: Louisiana State Highway Department, Baton Rouge, La; L. H. Hadnot, Projecting Engineer.

PROJECT: Clearing, grubbing, excavation and grading of 4.886 miles of Portland Cement concrete pavement on Pollock-Lincecum Highway, Grant Parish, Junction Route 14, northerly on relocation of Route 14. Work includes slab and mulch sodding, laying of 18 in., 24 in., and 30 in. culvert pipes and 6 in. and 8 in. perforated concrete pipes; installing concrete test piles, meshed and barbed wire fences grouted concrete block revetments; and removing and relocating buildings.

CONDITIONS: Stipulated contract time is 200 contract days. Access to job site is available by the Missouri-Pacific Railroad. Prevailing skilled labor wage rate is $1.25 per hour; semi-skilled, $.70 per hour; and common, $.60 per hour.

BIDS: Four bids were received, ranging from the contract low of $649,538.29 to $702,296.38. Contract was awarded October 8, 1947.

LIST OF BIDDERS:

1. W. R. Aldrich & Co., Baton Rouge, La. (contract) $649,538.29
2. T. L. James & Co., Inc. Ruston, La. 674,329.66
3. Central Const. Co., Inc., Monroe, La. 683,292.73
4. Austin Bridge Co. & Austin Road Co., Dallas, Texas 702,296.38

	Item	Quantity	Unit Prices: (1)	(2)	(3)
1	Clearing	90.744 ac	$125.00	$100.00	$140.00
2	Grubbing	55 ac	100.00	200.00	140.00
3	Common excavation	229,509 cy	.29	.30	.30
4	Drainage excavation	26,602 cy	.35	.30	.30
5	Special borrow excavation	191,327 cy	.37	.36	.40
6	Overhaul on excavation	20,402 st y	.02	.01	.01
7	Slab sodding	92,657 sy	.50	.60	.55
8	Mulch sodding	19,660 cy	1.35	1.00	1.25
9	S. C. gravel surface crse. (gr. B spec.)	1,275 cy	3.50	4.00	4.00
10	P.C. concr. pvt., type B (22'-9"-6"-9")	62,111.4 sy	2.44	2.66	2.65
11	P. C. concr. pvt., type B (8" uniform)	432 sy	3.50	3.50	3.50
12	P. C. concr. pvt., type B (6" uniform)	1,222.2 sy	2.44	2.50	2.55
13	Exp. joint filler (wood) (¾")	2,250 sf	.45	.50	1.00
14	Poured filler, asphalt mineral	19 ton	100.00	80.00	85.00
15	Dowel assembly	28,690 lf	.38	.35	.45
16	Tie bar assembly	25,750 lf	.06	.10	.10
17	Black magnetic iron traffic stripes	258 sta	6.00	5.00	6.50
18	Class "A" concrete	1,999.97 cy	50.00	52.00	49.40
19	Class "D" concrete	350.21 cy	30.00	32.00	36.00
20	Deformed reinforcing steel	358,543 lb	.10	.10	.10
21	Fabricated carbon steel	51,153 lb	.35	.32	.33
22	R. C. culvert pipe (std. str.)—18"	279 lf	3.00	3.00	3.50
23	R. C. culvert pipe (std. str.)—24"	549 lf	4.50	4.50	4.75
24	R. C. culvert pipe (std. str.)—30"	843 lf	6.00	6.00	6.00
25	Fert. broadcast (comr. fert.) (6-8-4)	31,200 lb	.05	.05	.05
26	Precast concrete piles—10"	5,215 lf	7.50	8.00	6.85
27	Jetting concrete piles	127 ea	5.00	1.00	5.00
28	Unloaded concrete test piles	3 ea	750.00	800.00	700.00
29	Loading test piles	3 ea	250.00	200.00	200.00
30	Pilot holes	127 ea	1.00	5.00	5.00
31	New barbed wire fence	13.45 sta	15.00	18.00	17.50
32	New comb. mesh & barbed wire fence	81.78 sta	18.00	20.00	20.00
33	Single swinging walk gates	5 ea	25.00	30.00	40.00
34	Single swinging driveway gates	10 ea	40.00	50.00	50.00
35	Project marker (bronze)	2 ea	25.00	20.00	40.00
36	R/W markers (concrete posts)	74 ea	4.00	4.00	4.00

Continued on next page

GET THE JOBS DONE FAST

Why "send a boy to do a man-sized job?" Tackle your big, tough jobs with the huge Allis-Chalmers HD-19 and Baker 'dozer — the most powerful team on earth. Get your jobs done faster and at lowest cost.

Plenty of heft for heavy duty, plenty of weight for all weather traction, plenty of power for tough going, plenty of speed for faster operating cycles—all add up to plenty of profit on any job.

Before you buy any bulldozer — check Baker!

It's specifically built into the HD-19 — to match its speed, power and weight. It's the biggest bulldozer in the business — it's the biggest yardage producer in the history of earth-moving.

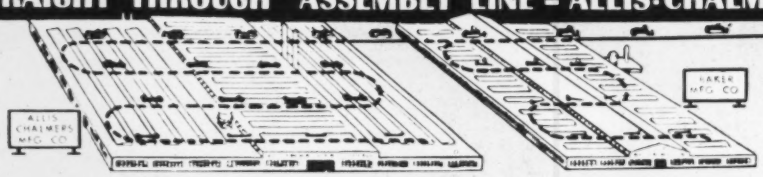
Baker Bulldozers and Gradebuilders are available for the HD-19 with either hydraulic or cable control. See your Allis-Chalmers dealer today.

BAKER MFG. CO., Springfield, Ill.

BAKER

BAKER They Go Together! A-C

"STRAIGHT THROUGH" ASSEMBLY LINE – ALLIS-CHALMERS TO BAKER TO YOU!



The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops, adjoins the Allis-Chalmers crawler tractor plant.
When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line

Cement Concrete Pavement, Baton Rouge, La.

Continued from preceding page

37 Grouted concrete block revetments	1,725 sy	3.00	3.00	4.50
38 Salvaged surfacing material	75 cy	2.00	3.00	2.00
39 Perforated concrete pipe—6"	366 lf	1.50	2.00	2.50
40 Perforated concrete pipe—8"	1,900 lf	1.65	2.15	2.75
41 Concrete handrail	1,098.52 lf	4.50	4.00	5.10
42 Rem. & reloc. of bldgs. & misc. strs.—5 units	lump sum	1,560.00	910.00	1,550.00
43 Moving bldgs. & misc. strs.—625 bldg. ft.	lump sum	222.50	430.00	245.00

Bituminous Surfaced Road, Statesboro, Ga.

OWNER: City of Statesboro, Georgia; Wiedeman and Singleton, Engineers.

PROJECT: Excavating and paving 2.4 miles of street, curb and gutter with a pebble soil base course and bituminous surface treatment; installing storm sewers and appurtenances in Statesboro, Georgia.

CONDITIONS: All materials to be furnished by contractor. Access to job is available by both rail and highway. Stipulated contract time is 120 working days. Skilled wage rate is $1.75 per hr.; semi-skilled, $1.00 per hr.; and common, $.75 per hr.

BIDS: Eight bids were received, ranging from the contract low of $94,836.80 to $124,837.65. Contract was awarded September 4, 1947.

LIST OF BIDDERS:

1. Ridle Huber & Co., Greenwood, S. C. (contract) $94,836.80
2. T. D. Lamb, Jr., Vidalia, Ga. 99,298.85
3. Somers Const. Co., Vidalia, Ga. 103,048.07
4. A. B. Newton, Vidalia, Ga 104,508.25
5. J. G. Attaway Const. Co., Statesboro, Ga. 118,769.25
6. Scott Const. Co., Thomasville, Ga. 120,824.25
7. Ballenger Paving Co., Greenville, S. C. 121,252.00
8. Stewart Bros., Atlanta, Ga. 124,837.65

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Excavation for grading and barrow	10,600 cy	$0.70	$0.50	$0.48
2	Pebble soil base course—6"	37,500 sy	.28	.30	.41
3	Overhaul on excavation	26,000 sy	.015	.015	.015
4	Double bit. surface treatment	37,500 sy	.39	.42	.35
5	Conc. paving for valley gutter construction & widening—6"	1,050 sy	3.00	3.25	4.16
6	Conc. driveway returns	280 ea	5.00	5.00	3.00
7	Comb. conc. curb & gutter	21,120 lf	1.40	1.50	1.39
8	Integral conc. curb—6"x8"	316 lf	.30	.50	.30
9	Concrete header	1,303 lf	.25	.50	.50
10	Class "A" conc. for culvert ext. & extra height curbs	9 cy	75.00	60.00	75.00
11	Class "B" conc. for steps, headwalls & retaining walls	19 cy	55.00	60.00	50.00
12	Bit. bound stone base course at R. R. crossing	117 sy	1.80	2.00	3.50
13	Conc. sidewalk replaced	11 sy	2.50	3.00	3.00
14	Conc. paving, asphalt paving valley gutter & sidewalk removed	60 sy	.25	1.00	.50
15	Comb. conc. curb & gutter removed	420 lf	.40	1.00	.50
16	Conc. curb removed	570 lf	.10	.50	.30
17	Bar reinf. steel for culvert ext.	0.3 tons	200.00	200.00	300.00
18	Castiron pipe installation for sanitary sewers—8"	1 ea	35.00	100.00	75.00
19	Standard brick manholes—4' 0" dia.				
	(a) 0' to 4' deep	13 ea	105.00	100.00	150.00
	(b) 4' to 6' deep	7 ea	120.00	125.00	180.00
	(c) 6' to 8' deep	1 ea	145.00	150.00	200.00
20	Standard brick manholes—6' 0" dia.				
	(a) 8' to 10' deep	1 ea	285.00	200.00	250.00
21	Catch basin, type "A"				
	(a) 0' to 4' deep	34 ea	125.00	100.00	100.00
	(b) 4' to 6' deep	10 ea	155.00	125.00	110.00
22	Catch basin, type "B"				
	(a) 0' to 4' deep	4 ea	145.00	125.00	115.00
	(b) 4' to 6' deep	1 ea	170.00	150.00	150.00
23	Special catch basin, Sta. 4+57, Church St	1 ea	175.00	150.00	100.00
24	Conc. catch basin extensions	35 lf	13.00	10.00	17.00
25(a)	Sewer pipe—12", 0' to 4' cut	2,020 lf	1.50	1.70	1.50
(b)	12", 4' to 6' cut	183 lf	1.75	1.85	1.70
(c)	15", 0' to 4' cut	318 lf	2.00	2.15	1.80
(d)	15", 4' to 6' cut	477 lf	2.25	2.35	2.20
(e)	18", 0' to 4' cut	228 lf	2.25	2.75	2.44
(f)	18", 4' to 6' cut	222 lf	2.65	3.00	2.70
(g)	21", 0' to 4' cut	331 lf	3.10	3.65	3.19
(h)	21", 4' to 6' cut	533 lf.	3.35	4.00	3.40
(i)	24", 0' to 4' cut	324 lf	3.10	4.40	3.74
(j)	24", 4' to 6' cut	42 lf	3.35	4.70	4.00
(k)	42", 0' to 4' cut	45 lf	10.00	11.15	11.20
(l)	42", 4' to 6' cut	15 lf	10.00	11.65	12.00
26	Cast iron manhole covers & frames—460 lb	27 ea	36.80	50.00	75.00
27	Adjusting existing structures to grade	52 ea	20.00	10.00	25.00
28	Existing structures removed	23 ea	10.00	20.00	100.00
29	Connections to existing struct	3 ea	15.00	20.00	100.00
30	Exist. sewer pipe & culvert pipe removed (all sizes)	1,300 lf	.50	1.00	1.00
31	Ditch excavation	160 cy	1.50	1.00	1.00
32	Rip rap	90 sy	1.50	5.00	5.00

Surfacing State Highway, California

OWNER: State Division of Highways, Sacramento, California; G. T. McCoy, state highway engineer.

PROJECT: Construction of state highway, about 6.6 miles in length, on Route 2, Sections E, SLO, between Miles Station and March St. in San Luis Obispo County, California. Work includes grading and surfacing with plant-mixed surfacing on crusher-run base.

CONDITIONS: Owner to furnish brass plates for center line monuments. Access to job site is available by both rail and highway. Work to begin 15 days after signing contract. Stipulated wage rates are: skilled labor, not less than $1.50 per hr.; semi-skilled, not less than $1.40 per hr.; and common, not less than $1.35 per hr.

BIDS: Eleven bids were received, ranging from the contract low of $1,338,523.65 to $1,681,227.30. Contract was awarded November 11, 1947.

LIST OF BIDDERS:

1. Fredricksen & Kasler, Sacramento, Calif. (contract) $1,338,523.65
2. N. M. Ball & Sons & Madonna Const. Co., Berkeley, Calif. 1,363,591.50
3. Bressi & Bevanda Constructors, Inc., Los Angeles, Calif. 1,374,526.65
4. Morrison-Knudsen Co., Inc., San Francisco, Calif. 1,403,791.75
5. Peter Kiewit Sons Co., Arcadia, Calif. 1,411,457.95
6. Winston Bros. Co., Azusa, Calif. 1,468,650.50
7. Guy F. Atkinson Co., South San Francisco, Calif. 1,491,628.75
8. A. Teichert & Son, Inc., Sacramento, Calif 1,495,795.00
9. Fredrickson & Watson Const. Co., Oakland, Calif. 1,572,714.60
10. Macco Corp., Clearwater, Calif. 1,644,677.05
11. J. E. Haddock, Ltd., Passadena, Calif. 1,681,227.30

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Clearing and grubbing	346 sta	$33.00	$100.00	$46.00
2	Removing concrete	1,865 cy	6.00	6.00	4.60
3	Roadway excavation	553,000 cy	.48	.45	.43
4	Structure excavation	8,760 cy	3.00	4.00	2.85
5	Ditch & channel excavation	2,250 cy	2.00	1.75	1.15
6	Imported borrow, Type A	139,830 ton	.65	.90	.63
7	Imported borrow, Type B	76,000 ton	.52	.55	.52
8	Overhaul	14,900,000 sta y	.005	.003	.0025
9	Placing selected rock fill	14,000 cy	1.00	.87	.58
10	Compacting original ground	47,000 sy	.16	.05	.05
11	Preparing slopes (slope erosion prot.)	72,500 sy	.075	.08	.28
12	Ice plant cuttings	350,000 ea	.04	.03	.045
13	Dev. wat. sup. &furn. wat. equip.	lump sum	9,700.00	12,000.00	6,000.00
14	Applying water	27,000 M ga	1.00	1.45	1.15
15	Finishing roadway	346 sta	20.00	20.00	12.00
16	Crusher run base	56,100 ton	2.35	2.40	2.30
17	Liquid asphalt, SC-2 (pr. ct. & pen. tr.)	485 ton	18.00	20.00	18.40
18	Asphaltic emulsion (sl. ct. & pt. bdr.)	165 ton	28.00	28.00	34.50
19	Screenings (sl. ct.)	1,400 ton	5.50	5.70	5.75
20	Paving asphalt (P. M. S., Type A)	1,840 ton	17.00	16.00	18.40
21	Mineral aggregate (P. M. S., Type A)	33,450 ton	3.85	4.20	5.30
22	Liquid asphalt SC-5 or 6 (P. M. S., Type B)	910 ton	17.00	16.00	18.40
23	Mineral aggregate (P. M. S., Type B)	16,500 ton	3.85	4.20	5.30
24	Placing P. M. S. (ditches & slope drains)	1,900 sf	.25	.12	.28
25	Raised bars	1,100 lf	1.00	.70	1.15

Continued on next page

Quickly adjusted for toe-hole drilling

Because of the flexibility of its mounting the G-200R Wagon Drill can be quickly adjusted for toe-hole drilling or bench drilling. For line drilling, or drilling close to the face, the carriage wheels can be turned at right angles.

The main frame, uprights and mounting, are of seamless steel tubing, providing maximum strength per pound of weight. The sliding cone, with a 36-inch adjustment, offsets ground irregularities or uneven steel lengths. With roller-bearing wheels and 6.00 x 16 pneumatic tires, it can be moved with ease and speed over rough ground.

The G-200R Wagon Drill is available with CP-50N (3″), CP-60N (3½″) or CP-70 (4″) Drifters. Write for complete data.

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Surfacing State Highway, California

Continued from preceding page

26	Douglas fir timber	6.5 Mf bm	300.00	250.00	225.00
27	Class "A" P. C. C. (structures)	2,200 cy	53.50	46.00	57.50
28	Class "A" P. C. C. (footing blocks)	290 cy	35.00	35.00	46.00
29	Furn. bar reinf. steel	260,500 lb	.075	.07	.07
30	Placing bar reinf. steel	260,500 lb	.03	.025	.05
31	Furn. structural steel	217,000 lb	.10	.09	.09
32	Erecting structural steel	217,000 lb	.04	.035	.07
33	Steel railing	337 lf	10.00	8.50	8.00
34	Furn. treated Douglas fir piling	380 lf	1.50	1.50	2.30
35	Driving timber piles	10 ea	55.00	60.00	175.00
36	Furn. steel piling	4,600 lf	2.30	2.60	2.45
37	Driving steel piles	184 ea	36.00	40.00	70.00
38	Steel angles (curb inlets)	250 lb	.50	.60	.55
39	Cast steel frames & covers for drop inlets	2 ea	65.00	70.00	80.00
40	Sacked concrete riprap	860 cy	31.00	22.00	25.30
41	Class "A" P. C. C. (slope paving)	30 cy	35.00	35.00	34.50
42	Class "A" P. C. C. (curbs & sidewalks)	370 cy	38.00	30.00	40.00
43	Right of way monuments	105 ea	5.00	6.00	5.00
44	Center line monuments	40 ea	5.00	20.00	11.50
45	Metal plate guard railing	8,630 lf	2.90	2.55	2.60
46	Culvert markers & guide posts	390 ea	5.00	5.00	5.75
47	Access opening markers	90 ea	6.00	10.50	9.00
48	New property fence	9.2 mi	1,100.00	1,400.00	1,200.00
49	Drive gates	33 ea	60.00	45.00	45.00
50	Red reflectors	27 ea	2.00	4.00	3.50
51	R. C. P.—18"	2,015 lf	4.15	4.00	5.25
52	R. C. P.—24"	2,310 lf	5.90	6.00	6.25
53	R. C. P.—30"	576 lf	7.40	7.50	7.50
54	R. C. P.—36"	730 lf	10.50	11.00	10.35
55	Spillway assemblies	44 ea	25.00	25.00	30.00
56	C. M. P. downdrains (16gal.)—8"	550 lf	1.80	1.75	2.25
57	Bank protection fence	850 lf	10.00	8.00	5.75
58	Demolishing buildings and appurtenances	lump sum	1,900.00	12,500.00	3,500.00
59	Removing existing bridge	lump sum	500.00	1,000.00	1,700.00

Highway Improvement, Utah

OWNER: State Road Commission, Salt Lake City, Utah; Roy W. McLeese, State Road Engineer.

PROJECT: Construction of 9.271 miles of 3-in. plant mixed bituminous surfaced road between Box Elder County Line and Wellsville in Cache County.

CONDITIONS: All materials are to be furnished by the contractor. Stipulated contract time is 250 working days. Access to job site is by highway. Skilled wage rate ranges from $1.50 to $1.75 per hour, semi-skilled from $1.00 to $1.50; common wage rate is $.875 per hour.

BIDS: Seven bids were received, ranging from the contract low of $183,541 awarded Sept. 17, 1947 to $230,177.

LIST OF BIDDERS:

1. Parson & Fife Const. Co., Brigham City, U. (cont.) $183,541.00
2. W. W. Clyde & Co., Springville, Utah 190,797.50
3. Carl E. Nelson Co., Logan, Utah 193,473.00
4. Olof Nelson Const. Co., Logan, Utah 206,504.00
5. Palfreyman Const. Co., Provo, Utah 217,582.90
6. Reynolds Const. Co., Springville, Utah 218,035.00
7. L. T. Johnson Const. Co., Ogden, Utah 230,177.00

	Item	Quantity	Unit Prices: Engineer's Estimate	(1)	(2)
1	Plant Mixed Bituminous Surfacing	26,000 ton	$2.30	$2.15	$2.20
2	Bituminous Material, 200-300 Pen.	280,000 gal	.12	.115	.12
3	Bituminous Material, Type MC-1	80,000 gal	.14	.125	.13
4	Bituminous Material, Type RC-4	40,000 gal	.14	.13	.135
5	Cover Material	2,000 ton	2.50	2.50	2.50
6	Cr. Rock or Cr. Grav. Surf. Course	46,000 ton	.75	.58	.64
7	Gravel or Crushed Rock Base Course	52,000 ton	.70	.56	.58
8	Embankment Protector	1 ea	25.00	50.00	20.00
9	Guard Rail	5,330 lf	2.25	2.50	1.25
10	Guide Posts	101 ea	4.50	4.00	7.00
11	8" C. G. M. Pipe (Soldered Joints)	96 lf	1.50	2.00	1.75
12	Resetting Guard Rail	900 lf	1.50	1.50	1.50
13	Watering	1,120 1000 gal	2.00	1.25	1.75
14	Rolling	680 hr	5.00	4.00	5.00

Van Wyck Expressway, Queens, N. Y.

OWNER: State of New York, Department of Public Works; Thomas F. Farrell, Chief Engineer.

PROJECT: Partial construction of a portion of the Van Wyck Expressway, Queens County, New York, between 105 Ave. and 115 Ave. Work includes construction of a trunk sewer, and 0.82 miles of grading and paving of service roads. Demolition of certain buildings remaining within contract limits is necessary.

CONDITIONS: All materials to be furnished by contractor. Project to be completed by September 1, 1948. Access to job site is available by rail, highway and water. Minimum hourly wage rates are: bulldozer operators, $2.12½; structural cement finishers, $2.50; structural iron and steel workers, $2.75; power shovel operators, $2.87½; truck drivers (over 1½ tons), $1.63½; and unskilled labor, $1.50.

BIDS: Four bids were received, ranging from the contract low of $1,320,529.50 to $1,422,275.00. Engineer's estimate was $1,445,000.00. Contract was awarded December 17, 1947.

LIST OF BIDDERS:

1. Tully and DeNapoli, Inc., Long Island City, N. Y. (contract) $1,320,529.50
2. Hendrickson Bros., Inc., Valley Stream, N. Y. 1,348,649.69
3. Gull Contr. Co., Inc. and L. G. DeFelice and Son, Inc., Flushing, N. Y. 1,373,301.75
4. Rusciano and Sons, Inc., and DelBaso Const. Corp., New York, N. Y. 1,422,275.00

	Item	Quantity	Unit Prices: (1)	(2)	(3)
1	Clearing & grubbing	lump sum	$13,000.00	$13,125.00	$10,500.00
2	Unclass. excavation	322,000 cy	.67	.80	.75
3	Trench culv. & br. excav	16,000 cy	1.75	1.50	1.40
4	Trimming shoulders & slopes	lump sum	13,000.00	12,200.00	7,500.00
5	Preparing fine grade	31,000 sy	.22	.12	.25
6	Vit. sewer pipe—6"	1,100 lf	3.00	1.20	2.50
7	Vit. sewer pipe—8"	1,200 lf	1.20	3.00	2.75
8	Vit. sewer pipe—10"	1,000 lf	1.65	3.00	3.25
9	Vit. sewer pipe—12"	3,250 lf	2.10	4.00	3.75
10	Vit. sewer pipe—15"	110 lf	3.10	5.00	4.50
11	Vit. sewer pipe—21"	190 lf	5.50	6.00	6.50
12	Vit. sewer pipe—24"	575 lf	17.00	7.00	10.50
13	Cast iron pipe—6"	500 lf	2.60	5.00	2.50
14	Cast iron pipe—12"	70 lf	6.00	10.00	6.00
15	Spec. RC pipe—15"	770 lf	3.60	4.00	5.50
16	Spec. RC pipe—18"	40 lf	5.00	4.00	6.75
17	Spec. RC pipe—24"	250 lf	8.00	6.00	8.75
18	Spec. RC pipe—30"	275 lf	11.00	8.00	10.00
19	Spec. RC pipe—66"	110 lf	32.00	30.00	27.00
20	Portland cement	11,200 bbl	3.00	3.25	3.25
21	Natural cement	800 bbl	4.00	4.00	3.50
22	Spec. portland cement	100 bbl	4.50	5.00	4.00
23	First class concrete	800 cy	29.00	40.00	30.00
24	Bar reinf. for structures	16,000 lb	.15	.12	.12
25	Misc. iron & steel	182,500 lb	.14	.15	.15
26	Bottom crse. broken stone	170 cy	8.00	10.00	7.00
27	Top crse. bit. mac. mix method optional	250 ton	11.00	14.00	9.00
28	Membrane waterproofing with p. c.	450 sy	7.50	4.50	4.00
29	Maint. traf. for bit. mac.	10,000 lf	.25	.50	.50
30	Protect traffic	lump sum	6,000.00	6,250.00	5,000.00
31	Temp. sheet. & brace (wood)	112,000 sf	.65	.20	.30
32	Perm. sheet. & brace	5 Mf bm	250.00	200.00	200.00
33	Screened gravel, loose measure	120 cy	7.00	7.00	5.00
34	Granite curb	730 lf	5.00	7.50	6.00
35	Reset old curb	100 lf	2.50	5.00	3.00
36	Conc. curb, type AS	16,300 lf	1.30	1.50	1.15
37	Manholes, type A	2 ea	700.00	500.00	225.00
38	Drop inlets, type C	18 ea	460.00	300.00	300.00
39	Drop inlets, type D	3 ea	460.00	300.00	225.00
40	Drop inlets, type QA	57 ea	275.00	300.00	200.00
41	Drop inlets, type QB	10 ea	85.00	200.00	150.00
42	Regular manhole, type QC8	10 ea	230.00	300.00	180.00
43	Regular manhole, type QC10	7 ea	240.00	300.00	175.00
44	Regular manhole, type QC12	6 ea	260.00	300.00	175.00
45	Shallow manhole, type QD12	5 ea	320.00	300.00	160.00
46	Shallow manhole, type QD15	1 ea	330.00	300.00	185.00
47	Shallow manhole, type QD21	3 ea	360.00	300.00	225.00
48	Shallow manhole, type QF30	1 ea	360.00	300.00	275.00
49	Std. drop pipe manhole, type QH15	1 ea	1,300.00	1,100.00	500.00
50	Std. drop pipe manhole, type QH24	1 ea	1,900.00	1,100.00	500.00
51	Std. drop pipe manhole, type QH30	1 ea	1,750.00	1,100.00	500.00
52	Std. drop pipe manhole, type QK66	2 ea	1,350.00	750.00	500.00
53	Spec. manhole, type QL	2 ea	375.00	400.00	250.00
54	Change elev. of manholes & catch basins	45 ea	50.00	50.00	40.00
55	Salvaging & resetting exist. castings	10 ea	40.00	50.00	20.00
56	Concrete sidewalk	7,500 sy	2.75	3.50	3.50
57	Timber & lumber	25 Mf bm	280.00	210.00	250.00
58	Spread top soil	1,500 cy	1.60	3.00	2.50
59	Demolition	lump sum	11,000.00	10,000.00	8,000.00
60	Sheet asph. pavement	30,000 sy	2.75	4.00	3.50
61	Stone block surface	120 sy	5.00	5.00	6.00
62	Granite header	660 lf	2.25	4.00	4.00
63	Timber curbing	1,100 lf	.75	1.00	1.00
64	Cinders, loose measure	100 cy	5.00	4.00	4.00
65	Timber guide rail, type B	750 lf	9.00	3.00	6.25
66	Conc. fdn. for dead end warn. light	10 ea	175.00	75.00	150.00
67	Traff. light conduit inst. in exist. light post	1 ea	40.00	45.00	150.00
68	Steel pipe conduit—2"	1,200 lf	2.50	2.30	2.50

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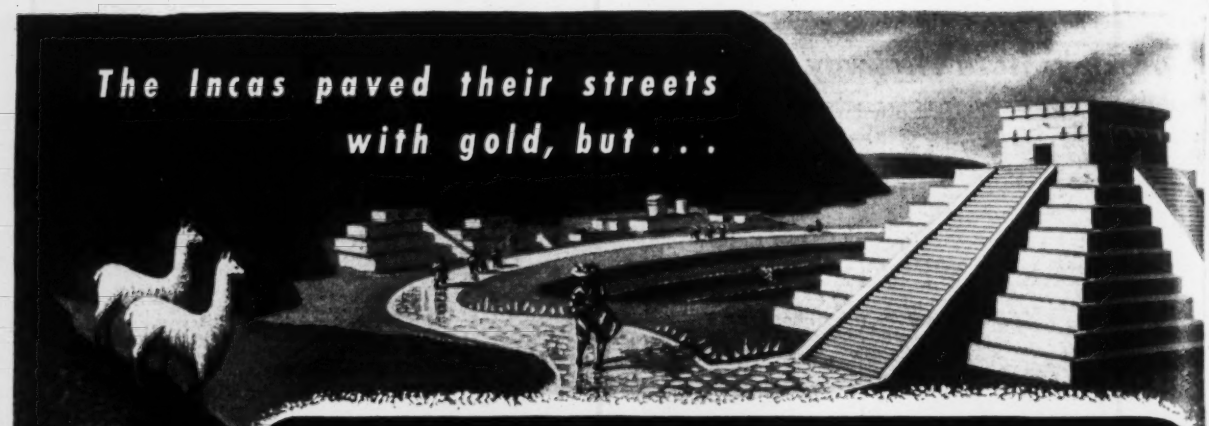

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Van Wyck Expressway, Queens, N. Y.

Continued from preceding page

69	Police tel. pull box 2'9" x 2'9" x 3'6"	3 ea	300.00	230.00	450.00
70	Temporary light poles	5 ea	175.00	330.00	330.00
71	Temporary overhead wire	1,000 lf	.50	.23	.30
72	Temporary barricades lighting	7 ea	450.00	72.00	725.00
73	Unit change of barricade lighting	7 ea	25.00	5.00	20.00
74	Temporary lighting of roadway warn. signs	6 ea	230.00	35.00	400.00
75	Furn. & install. lamppost type M & luminaire	19 ea	570.00	339.00	550.00
76	Furn. & install. lamppost type G & luminaire	52 ea	550.00	300.00	450.00
77	Concrete sidewalk box type I	5 ea	230.00	230.00	25.00
78	Steel conduit—1½"	150 lf	3.50	3.00	2.75
79	Steel conduit—2"	530 lf	2.50	3.00	3.85
80	Furn. & install. conduit #6 bare	630 lf	.25	.25	.25
81	Furn. & install. conduit #6 RCL	1,300 lf	.60	.45	.40
82	Astronomical time switches	66 ea	60.00	35.00	50.00
83	Reinf. conc. trunk sewer 6'6" x 8'0"	2,567 lf	112.00	115.00	138.75
84	Reinf. conc. trunk sewer 6'6" dia.	1,450 lf	82.00	64.00	90.00
85	Chamber on trunk sewer at 115th Ave.	1 ea	5,000.00	3,500.00	4,000.00
86	Chamber on trunk sewer near 109th Ave.	1 ea	1,600.00	2,500.00	2,000.00
87	Chamber on trunk sewer at 109th Ave.	1 ea	2,200.00	2,000.00	2,000.00
88	Chamber on trunk sewer at 107th Ave.	1 ea	3,000.00	2,500.00	2,500.00
89	Manholes & drop pipe manholes	18 ea	650.00	400.00	300.00
90	Perm. sheet & brace	10 Mf bm	250.00	200.00	200.00
91	Vit. sewer pipe (sanitary)—8"	360 lf	32.00	10.00	10.00
92	Vit. sewer pipe (sanitary)—10"	1,510 lf	24.00	12.00	12.00
93	Vit. sewer pipe (storm)—12"	3,880 lf	4.00	12.00	8.00
94	Vit. sewer pipe (storm)—15"	1,430 lf	5.50	13.00	11.00
95	Vit. sewer pipe (storm)—18"	1,590 lf	6.50	16.00	10.00
96	Vit. sewer pipe (storm)—24"	85 lf	9.00	18.00	20.00
97	Spec. RV pipe (storm)—30"	125 lf	63.00	20.00	25.00
98	Manholes, type QR8	3 ea	320.00	500.00	250.00
99	Manholes, type QR10	10 ea	330.00	500.00	300.00
100	Manholes, type QS12	28 ea	320.00	400.00	250.00
101	Manholes, type QS15	10 ea	380.00	400.00	300.00
102	Manholes, type QS18	11 ea	350.00	400.00	300.00
103	Manholes, type QS24	1 ea	370.00	400.00	300.00
104	Manholes, type QS30	1 ea	500.00	500.00	400.00
105	Manholes, type QT18	1 ea	1,000.00	800.00	800.00
106	Spurs on sanitary sewers	50 ea	10.00	9.50	6.00
107	Spurs on storm sewers	190 ea	10.00	9.50	6.00
108	House conn. on sanitary sewer	130 lf	15.00	3.50	10.00
109	House conn. on storm sewer	250 lf	10.00	3.50	10.00
110	Wooden signs	4 ea	250.00	100.00	200.00
111	Permanent barricade	1,100 lf	5.50	4.00	3.50
112	Maint. traff. at st. crossings	lump sum	2,500.00	10,342.19	5,000.00

Highway Improvements, White Pine County, Nevada

OWNER: State Department of Highways, Carson City, Nevada; W. T. Holcomb, engineer.

PROJECT: Grading and surfacing of 15.208 miles of highway on Routes 2 and 24, Sections E 2 and A, B in White Pine County, from Magnuson's Ranch to a point 15 miles North. Work includes roadway, drainage and structure excavation and the installation of 4,180 lin. ft. of corrugated metal pipe.

CONDITIONS: All materials to be furnished by contractor. Access to job site is available by both rail and highway. Stipulated contract time is 200 days. Prevailing skilled labor wage rate is $1.50 per hr.; semi-skilled, $1.40 per hr.; and common, $1.30 per hr.

BIDS: Eight bids were received, ranging from the contract low of $250,570.00 to $308,352.85. Contract was awarded November 7, 1947.

LIST OF BIDDERS:

1. Silver State Const. Co., Fallon, Nevada (contract) $250,570.00
2. Hoops Const. Co., Twin Falls, Idaho 256,377.85
3. Dodge Const., Inc., Fallon, Nevada 279,493.80
4. Carl E. Nelson Co., Logan, Utah 279,775.30
5. Hunt & Frandsen, Reno, Nevada 280,576.20
6. J. M. Sumsion, Springville, Utah 301,391.65
7. Isbell Const. Co., Reno, Nevada 301,955.40
8. W. W. Clyde & Co., Springville, Utah 308,352.85

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Signs	lump sum	$500.00	$600.00	$750.00
2	Roadway excavation	160,020 cy	0.22	0.25	0.29
3	Drainage excavation	1,240 cy	0.50	0.50	0.50
4	V-Type ditches	1,008 sta	4.00	4.00	5.00
5	Overhaul	78,100 sta y	0.02	0.01	0.015
6	Overhaul	7,940 mi y	0.20	0.20	0.15
7	Structure excavation	990 cy	2.00	1.00	1.50
8	Backfill	1,760 cy	1.00	1.25	1.50
9	Water	10,665 M gal	1.00	1.25	1.50
10	Power roller	607 hr	6.00	6.00	5.00
11	Tamping roller	10,490 f hr	0.50	0.60	0.50
12	Type 1 gravel base	11,490 ton	0.35	0.50	0.50
13	Gravel surface	93,790 ton	0.64	0.65	0.75
14	Liquid asphalt, type MC-2(seal roadmix)	164 ton	35.00	31.00	30.00
15	Liquid asph. type SC-2 or SC-3 (roadmix)	2,287 ton	28.00	29.00	29.00
16	Roadmix (32-foot width)	15.21 mi	900.00	900.00	1,000.00
17	Roadmix (22-foot width) (temporary connection)	1.15 mi	700.00	600.00	600.00
18	Roadmix intersections	370 sy	0.25	0.50	0.10
19	Class A concrete	198 cy	55.00	45.00	50.00
20	Reinforcing steel	10,980 lb	0.10	0.12	0.15
21	Corrugated metal pipe—15"	40 lf	3.00	3.00	2.50
22	Corrugated metal pipe—18"	1,868 lf	3.50	3.00	3.00
23	Corrugated metal pipe—24"	554 lf	5.00	4.50	4.25
24	Corrugated metal pipe—30"	158 lf	6.00	6.00	5.25
25	Corrugated metal pipe—36"	60 lf	9.00	8.00	7.50
26	Corrugated metal arch pipe—22"x13"	1,348 lf	3.00	3.25	3.50
27	Corrugated metal arch pipe—29"x18"	46 lf	5.00	5.00	4.75
28	Corrugated metal arch pipe—43"x27"	106 lf	9.00	8.00	8.00
29	Culvert markers	178 ea	5.00	6.00	6.00
30	Guide posts	27 ea	5.00	6.00	6.00
31	Monuments	41 ea	5.00	6.00	6.00

Highway and Culvert, Grundy Co., Mo.

OWNER: Missouri State Highway Commission.

PROJECT: Grading of culverts and construction of bridge and pump house on Route E, Grundy County, east of Laredo, Missouri. Road work includes oil treatment of earth surface and is divided into two parts: the first, .982 miles long, includes laying of 420 lin. ft. of culvert pipe, and the second, 3.346 miles long, includes laying of 646 lin. ft. of culvert pipe, and removal of 171.45 ft. of hedge. The bridge is a continuous I-beam superstructure with concrete piers and floor. Pump house is a small frame building with concrete pump well.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by both rail and highway. Stipulated contract time is 140 working days. Prevailing hourly wage rates are: skilled labor, $.80; semi-skilled labor, $.50; and common labor, $.40.

BIDS: Two bids were received, the contract low of $112,648.90 and $117,766.90. Contract was awarded December 11, 1947.

LIST OF BIDDERS:

1. Atkinson-Windle Co., Chillicothe, Mo. (contract) $112,648.90
2. L. W. Riney Const. Co., Hannibal, Mo 117,766.90

	Item	Quantity	Unit Prices (1)	(2)
	Road Work			
1-D	Class A excavation	15,975 cy	$0.45	$0.50
1-I	Class 3 excavaton for structures	186 cy	3.00	3.00
1-O	Machine grading	5.0 sta	30.00	30.00
4A-A	Oil for treatment of earth roads (SC-2 liquid asph. material)	10,660 gal	0.13	0.14
16-B	Class B concrete (box culverts)	22.7 cy	45.00	60.00
18	Culvert pipe—12"	20 lf	2.25	2.40
18	Culvert pipe—15"	76 lf	2.50	2.65
18	Culvert pipe—18"	246 lf	3.00	2.85
18	Culvert pipe—24"	38 lf	4.00	3.90
18	Culvert pipe—30"	40 lf	5.00	5.00
19-A	Reinforcing Steel	1,870 lb	0.10	0.10
22-B	Creosoted timber piles in place	210 lf	3.50	4.00
30-B	Creosoted timber	7,050 f bm	0.40	0.60
33-A	Removal of existing structure	lump sum	100.00	350.00
	Bridge Work			
1-G	Class 1 excavation for structures	133 cy	12.00	10.00
1-H	Class 2 excavation for structures	218 cy	32.00	28.00
16-B	Class B concrete (superstructure)	141.0 cy	55.00	50.00
16-B	Class B concrete (substructure)	173.7 cy	60.00	68.00
17-B	Fabricated structural steel (substructure)	400 lb	0.40	0.50
17-B	Fabricated structural steel (I-beam spans)	157,200 lb	0.135	0.125
17-C	Steel castings	6,460 lb	0.70	0.75
22-A	Reinforcing steel	39,400 lb	0.10	0.10
22-B	Creosoted timber piles in place	309 lf	3.50	4.00
22-BI	Creo. timber pile cut-offs (at 50% of item 22-B)	45 lf	1.75	2.00
22-D	Stee. piles in place	195 lf	10.00	10.00
22-D1	Steel pile cut-offs (at 50% of item 22-D)	15 lf	5.00	5.00
23-M	Grouted riprap	60 cy	20.00	35.00
30-BB	Creosoted timber	5,420 f bm	0.50	0.60

Continued on next page

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Highway and Culvert, Grundy Co., Mo.

Continued from preceding page

33-B	Removal of existing structure	lump sum	250.00	300.00
	Pump Well and Pump House			
1-G	Class 1 Excavation for structures	56 cy	12.00	8.00
1-H	Class 2 excavation for structures	79 cy	32.00	28.00
16-B	Class B concrete	39.1 cy	65.00	75.00
19-A	Reinforcing steel	3,550 lb	0.12	0.10
61-A	Pump house	lump sum	850.00	850.00
	Road Work			
1-C	Hedge removal	171.45 f	20.00	20.00
1-D	Class A excavation	15,293 cy	0.40	0.50
1-I	Class 3 excavation for structures	572 cy	3.00	3.00
1-O	Machine grading	91.5 sta	30.00	30.00
4A-A	Oil for treat. of earth roads (SC-2 liq. asphalt mat.)	36,430 gal	0.13	0.14
16-B	Class B concrete (box culverts)	99.4 cy	45.00	50.00
18	Culvert pipe—15"	294 lf	2.50	2.65
18	Culvert pipe—18"	324 lf	3.00	2.85
18	Culvert pipe—36"	28 lf	8.00	7.00
19-A	Reinforcing steel	10,750 lb	0.10	0.10

Concrete Pavement and Bridge Over Angelico Creek, Virginia

OWNER: Department of Highways, Richmond, Virginia.

PROJECT: Construction of 8.488 miles of 24'x9" reinforced cement concrete pavement and bridge over the Angelico Creek in Virginia. The pavement and bridge are to extend from 7.880 miles west of Courtland to 16.368 miles west of Courtland. The bridge is to consist of 3 25 ft. reinforced concrete spans, 82 ft. 6 in. long with a 28 ft. roadway.

CONDITIONS: Access to job site is available by rail and highway. Completion of job is set for June, 1948. Prevailing skilled wage rates range from $1.50 to $2.00 per hr., and common from $.75 to $1.00 per hr. Semi-skilled wage rates are $1.00 or more per hr.

BIDS: Six bids were received, ranging from the contract low of $590,915.28 to $688,296.26. Contract was awarded June 18, 1947.

LIST OF BIDDERS:

1. Rea Const. Co., Charlotte, N. C. (contract) $590,915.28
2. Hechler Bros., Richmond, Va. 606,258.70
3. W. H. Scott, Inc., Franklin, Va. 638,941.58
4. E. W. Grannis Co. and Ballenger Pav. Co., Fayetteville, N. C. 651,060.56
5. Williams Paving Co., Norfolk, Va. 651,859.35
6. Bero Engr. and Const. Corp., Hampton, Va. 688,296.26

			Unit Prices		
	Item	Quantity	(1)	(2)	(3)
1	Clearing and grubbing	24 a	$300.00	$300.00	$400.00
2	Regular excavation	263,190 cy	.32	.28	.30
3	Borrow excavation	16,437 cy	.32	.35	.30
4	Concrete, class "A"	346 cy	50.00	47.50	60.00
5	Concrete, class "C"	64 cy	45.00	40.00	60.00
6	Metal reinforcement	30,134 lb	.09	.09	.10
7	Concrete R. of W. monuments	65 ea	3.00	2.50	4.00
8	Pipe under-drains—6 in.	23,341 lf	.75	1.00	.90
9	Sub-grade under-drains—CD1 or CD2	2,092 lf	.80	.80	.90
10	Concrete pipe—15 in.	1,026 lf	2.25	2.20	2.50
11	Concrete pipe—18 in.	291 lf	2.75	2.80	3.50
12	Pipe (3000-d)—15 in.	108 lf	3.00	2.50	3.00
13	Pipe (3000-d)—24 in.	102 lf	4.25	4.80	5.00
14	Pipe (extensions)—15 in.	273 lf	2.25	2.20	3.00
15	Pipe (extensions)—18 in.	162 lf	2.75	2.80	3.50
16	Pipe (extensions)—24 in.	444 lf	4.00	4.50	5.00
17	Pipe (relaid)	442 lf	3.00	2.50	5.00
18	W. i. pipe	39 lf	5.00	2.00	6.00
19	Concrete class "B"	137 cy	48.00	50.00	60.00
20	Timber piling (untreated)	1,500 lf	1.75	1.25	1.20
21	R/W monuments (reset)	44 ea	2.00	2.00	2.00
22	F. A. project marker	1 ea	5.00	5.00	6.00
23	F. A. & state project marker (reset)	1 ea	5.00	2.50	2.00
24	State project marker	1 ea	5.00	5.00	6.00
25	Soil (entr'a. (4")	433 cy	2.20	2.50	6.00
26	Soil (6")	1,200 cy	2.10	2.50	6.00
27	Soil (10")	745 cy	2.00	2.50	6.00
28	Reinf. conc. pave. (9")	119,877 sy	3.14	3.26	3.19
29	Subgrade material	48,629 cy	.60	.75	1.00
30	Bituminous material	8,237 gal	.15	.16	.25
31	Covering material	297 tons	5.00	5.00	5.00
	Superstructure				
32	Concrete, class "A"	108.4 cy	55.00	52.50	75.00
33	Reinforcing steel	25,670 lb	.09	.09	.10
	Substructure				
34	Concrete, class "A"	93.4 cy	50.00	52.50	75.00
35	Reinforcing steel	6,940 lb	.09	.09	.10
36	Concrete stab., rip rap	424 sy	5.00	4.50	4.00
37	Excavation class "A"	190 cy	5.00	5.00	10.00
38	Excavation, class "B"	54 cy	20.00	20.00	10.00
39	Piles (treated)	800 lf	3.00	2.00	2.50
40	Piles (untreated)	600 lf	1.75	1.25	1.20

Reinforced Concrete Bridge, Los Angeles, Calif.

OWNER: State Division of Highways, Los Angeles, California; G. T. McCoy, State Highway Engineer.

PROJECT: Con-truction of a reinforced concrete bridge with a 48-foot roadway across the Los Angeles River at Florence Avenue near the City of Bell, Calif. Grading and paving of approximately 0.26 miles of road with asphaltic concrete pavement and pre-mix pavement.

CONDITIONS: All materials are to be furnished by the contractor. Stipulated contract time is 350 working days. Access to job site is by rail and highway. Minimum wage rate for skilled labor is $1.50 per hour; for semi-skilled, $1.40; and for common, $1.35.

BIDS: Eleven bids were received, ranging from the contract low of $419,162.00 to $546,768.10. Contract was awarded August 29, 1947.

LIST OF BIDDERS:

1. H. B. Nicholson, Pasadena, Calif. (contract) $419,162.00
2. Guy F. Atkinson Co., San Francisco, Calif. 439,737.00
3. MacDonald, Kruse & Hensler, Glendale, Calif. 439,929.50
4. W. J. Disteli, Los Angeles, Calif. 443,061.00
5. Peter Kiewit Sons Co. 453,106.00
6. Carlo Bongiovanni, Hollywood, Calif. 462,785.60
7. Dimmitt & Taylor & K. D. Nicholas, Los Angeles, Calif. 467,606.50
8. Byerts & Dunn, Los Angeles, Calif. 481,948.50
9. Griffith Co., Los Angeles, Calif. 490,384.30
10. Oberg Bros., Inglewood, Calif. 545,865.00
11. Haddock Co., Pasadena, Calif. 546,768.10

			Unit Prices		
	Item	Quantity	(1)	(2)	(3)
1	Removing existing bridge	lump sum	$25,000.00	$11,000.00	$15,000.00
2	Removing concrete	460 cy	3.00	5.00	4.00
3	Clearing & grubbing	lump sum	2,000.00	1,100.00	4,000.00
4	Roadway excavation	3,700 cy	1.00	.60	.50
5	Structure excavation	3,450 cy	12.00	6.00	14.00
6	Imported borrow, type B	18,000 cy	1.25	.90	.85
7	Imported borrow, type A	4,300 tons	2.00	2.25	1.50
8	Preparing class "C" subgrade	16,100 sy	.15	.11	.15
9	Applying water	600 M gal	2.00	3.00	2.00
10	Class "A" P.C.C. (footing blocks)	883 cy	20.00	25.00	30.00
11	Class "A" P.C.C. (structure)	2,800 cy	42.00	60.00	51.25
12	Class "A" P.C. mort. (railing base)	5.5 cy	80.00	100.00	20.00
13	Misc. steel	12,500 lb	.30	.30	.35
14	Steel railing	906 lf	6.50	10.50	12.00
15	Furnishing concrete piling	17,010 lf	2.80	2.80	2.75
16	Driving piles	390 ea	30.00	30.00	50.00
17	Driving test piles	2 ea	150.00	200.00	200.00
18	Light stone riprap	240 cy	10.00	15.00	15.00
19	Class "A" P.C.C. (curbs, gutters & sidewalks)	450 cy	30.00	35.00	30.00
20	Furnishing bar reinforcing steel	775,000 lb	.06	.05	.053
21	Placing bar reinforcing steel	775,000 lb	.02	.03	.018
22	Engineers office	lump sum	2,000.00	1,000.00	2,000.00
23	Pre-mix pavement	280 tons	5.00	7.00	3.75
24	Asphaltic concrete pavement	3,700 tons	6.00	6.00	3.75
25	Sanitary sewers	lump sum	2,500.00	2,845.00	2,500.00

Connecticut River Bridge

OWNER: State Highway Commission, Hartford, Connecticut; W. G. Grove, Engineer.

PROJECT: Construction of high level fixed toll bridge, 2,454.5 ft. long, over the Connecticut River between Old Say-

Continued on next page

Connecticut River Bridge

Continued from preceding page

brook and Old Lyme, Connecticut. Roadway to include 2 26-ft. lanes, 4-ft. center mall, 2 3-ft. concrete sidewalks, 11 reinforced concrete piers and 2 reinforced concrete abutments. Piles of substructure to be all steel.

CONDITIONS: Construction of substructure and superstructure to be handled as separate contracts. Access to job site is available by railroad, highway and water. Skilled labor wage rates are $1.10 per hour; semi-skilled, $.90; and common labor, $.75 per hour.

Substructure

BIDS: Three bids were received January 20, 1947 for the substructure, ranging from the contract low of $1,179,470 to $1,313,270.

LIST OF BIDDERS:

1. Merritt Chapman, Scott, New London, Conn. (cont.) $1,179,470.00
2. A. I. Savin Construction Co., East Hartford, Conn. 1,216,250.00
3. Mariani Construction Co., New Haven, Conn. 1,313,270.00

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Clearing and grubbing	lump sum	$53,262.00	$24,000.00	$50,000.00
2	Earth excavation	2,300 cy	1.00	2.00	5.00
3	Bridge excavation (E. and W. abut.) (Piers 1, 2 and 11)	2,800 cy	3.00	4.00	5.00
4	Bridge excavation (Piers 3-10)	11,300 cy	14.00	20.00	22.00
5	Gravel fill	300 cy	5.00	3.00	10.00
6	One-half inch bit. expansion joint filler for bridges	460 sf	.30	1.00	2.00
7	Deformed steel bars	550,000 lb	.10	.09	.10
8	Class "A" concrete	22,500 cy	22.00	22.00	22.00
9	Pile clip angles	100 ea	4.00	10.00	10.00
10	Dimension stone masonry	560 cy	110.00	170.00	200.00
11	Lead pointing	6,400 lf	2.00	3.00	2.00
12	Furnishing steel piles	3,426,000 lb	.035	.035	.04
13	Driving steel piles	41,400 lf	2.00	1.00	1.00
14	Loading test piles	6 ea	1,000.00	1,000.00	1,000.00
15	Splicing steel piles	100 ea	45.00	35.00	50.00
16	Metal flashing	210 lb	2.00	2.00	3.00
17	Damp proofing	960 sy	.25	1.00	3.00
18	Rip rap	500 ton	6.00	6.00	5.00
19	Portland cement	32,100 bbl	3.00	3.00	3.00
20	Natural cement	5,900 bbl	3.00	3.00	3.00

Superstructure

BIDS: Three bids were received January 20, 1947 for the superstructure, ranging from the contract low of $2,015,185.40 to $2,409,528.00.

LIST OF BIDDERS:

1. American Bridge Co., New York, N. Y. (cont.) $2,015,185.40
2. Harris Structural Steel Co., New York, N. Y. 2,091,557.70
3. Mt. Vernon Bridge Co., Mt. Vernon, O. 2,409,528.00

	Item	Quantity	Unit Prices (1)	(2)	(3)
21	Deformed steel bars	386,000 lb	$0.1171	$0.115	$0.083
22	Structural carbon steel	7,194,000 lb	0.1226	0.1315	0.158
23	Structural silicon steel	4,561,000 lb	0.1416	0.1355	0.168
24	Reinforcement trusses	198,400 lf	.60	0.484	.75
25	Open steel grid floor	18,000 sf	4.29	3.135	3.50
26	Metal bridge rail	4,900 lf	14.70	22.50	20.00
27	Class "A" concrete	2,950 cy	50.92	66.99	50.00
28	Gutters and drainage material	lump sum	3,150.00	2,750.00	2,500.00
29	Portland cement	4,170 bbl	4.16	4.07	3.00
30	Natural cement	760 bbl	4.16	4.07	3.00

Little Red River Bridges, Arkansas

OWNER: Arkansas State Highway Commission, Little Rock, Arkansas; W. W. Zass, Engineer.

PROJECT: Construction of one reinforced concrete and structural steel cantilever deck plate girder bridge approximately 413.5 ft. in length and one reinforced concrete and structural steel I-beam bridge approximately 398.0 ft. in length on the Searcy—Judsonia Road, White County, Arkansas. The proposed bridges are located over Little Red River and Little Red River relief.

CONDITIONS: No materials will be furnished by the owner. Access to job site is available by Missouri Pacific Railway and Highway 67. Stipulated contract time is 230 working days. Skilled labor wage rate is $1.00 per hr.; semi-skilled, $.72 per hr.; and common, $.62 per hr.

BIDS: Two bids were received, the contract low of $269,824.90 and $310,115. Contract was awarded June 9, 1947.

LIST OF BIDDERS:

1. Massman Const. Co., Kansas City, Mo. (contract) $269,824.90
2. Forcum-James Co., Memphis, Tenn. 310,115.00

	Item	Quantity	Unit Prices (1)	(2)
1	Clearing	0.73 a	$350.00	$200.00
2	Dry excavation for structures	804 cy	4.00	4.00
3	Wet excavation for structures	1,330 cy	24.00	24.00
4	Solid rock excavation for structures	52 cy	16.00	25.00
5	Class "A" concrete for bridges	951.2 cy	40.00	40.00
6	Class "S" concrete for bridges	810.6 cy	45.00	50.00
7	Seal concrete for bridges	380.8 cy	23.00	25.00
8	Reinforcing steel	240,150 lb	.10	.08
9	Concrete piling—14" sq.	1,450 lf	6.00	9.50
10	Concrete piling—(16" octagonal)	1,965 lf	6.00	10.00
11	Concrete railing	836.5 lf	4.00	11.00
12	Concrete and struct. steel rail	822.5 lf	7.50	12.00
13	Struct. steel in beam spans	663,810 lb	.125	.14
14	Untreated timber piling	5,304 lf	1.75	1.40
15	Riprap	530 cy	8.00	16.00
16	Bridge name plates Type "A"	4 ea	50.00	25.00

Road Bridge and Approaches, Ga.

OWNER: Fulton County, Ga.; Mr. L. R. Epperson, Director, Public Works Department, engineer.

PROJECT: Construction of a reinforced concrete and steel bridge on Howell Mill Road over Peachtree Creek, Atlanta, Ga. The bridge, which measures 220 ft. in length, consists of a concrete deck on steel I-beams, 7-in. concrete approaches measuring 1,365 ft., a 36-ft. roadway and two 5-ft. sidewalks.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by both rail and highway. Stipulated contract time is 175 working days. Prevailing hourly wage rates are: skilled labor, $2.00; semi-skilled labor, $.80; and common labor, $.75.

BIDS: Eight bids were received, ranging from the contract low of $112,997.63 to $139,936.43. Contract was awarded January 23, 1948.

LIST OF BIDDERS:

1. R. T. Smith, Atlanta, Ga. (contract) $112,997.63
2. MacDougald Const. Co., Atlanta, Ga. 119,034.59
3. Stewart Bros., Atlanta, Ga. 126,454.12
4. Henry Newton Co., Decatur, Ga. 127,193.86
5. W. L. Cobb Const. Co., Decatur, Ga. 129,364.37
6. S. B. Slack, Decatur, Ga. 132,290.30
7. W. J. Tidwell, Jr., Douglasville, Ga. 132,483.62
8. G. L. Strickler, Austell, Ga. 139,936.43

	Item	Quantity	Unit Prices (1)	(2)	(3)
	Bridge				
1	Clearing & Grubbing	lump sum	$50.00	$125.00	$200.00
2	Class A Concrete	988.71 cy	47.50	48.50	47.50
3	Reinforcing Steel	128,790 lb	0.085	0.09	0.09
4	Structural Steel	lump sum	23,500.00	20,500.00	19,600.00
5	Excavation No. 1	2,165 cy	2.25	4.00	10.00
6	Hand Railing	440 lf	4.50	4.50	5.00
7	Unclassified Excav.	1,200 cy	0.50	0.42	0.50
8	Setting Gas Line Supports	lump sum	160.00	30.00	50.00
	Approaches				
9	Clearing & Grubbing	lump sum	150.00	200.00	250.00
10	Add. Clearing & Grubbing	3 ac	50.00	125.00	100.00

Continued on next page

Road Bridge and Approaches, Ga.

Continued from preceding page

11 Unclass. Excavation	8,136 cy	0.40	0.45	0.45
12 Paving Removed	4,736 sy	0.50	0.50	0.40
13 Adjust Manholes	1 ea	10.00	25.00	10.00
14 24" C. D. Pipe	84 lf	3.70	4.35	3.50
15 30" C. D. & Long. Pipe	144 lf	5.00	6.50	4.50
16 30" C. M. Pipe	109 lf	5.00	6.00	4.00
17 Brick Catch Basins	6 ea	140.00	150.00	100.00
18 Add. "H" Catch Basins	9 lf	20.00	20.00	20.00
19 CI. B Conc. Still. Basins	2 ea	150.00	235.00	150.00
20 7" Concrete Paving	3,826 sy	3.50	4.10	3.35
21 Integral Curb	2,253 lf	0.50	0.50	1.00
22 Finishing & Dressing	2,306 sy	0.05	0.04	0.08
23 Grassing	4,306 sy	0.05	0.06	0.05
24 Excav. for Culverts & Str	225 cy	1.00	1.75	1.00

Mystic River Bridge Piers, Mass.

OWNER: Mystic River Bridge Authority, Boston. Mass.; Charles A. Maguire and Associates, Boston, and J. E. Greiner Co., Baltimore, Md., engrs.

PROJECT: Construction of piers S-1 and S-2 of substructure of Little Mystic Channel Span, part of the Mystic River Bridge Project, Charlestown, Mass. Work includes 1,530 cu. yds. of excavation, 920 cu. yds. of wet excavation and furnishing and driving 15,195 lin. ft. of steel H piles.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by rail, highway and water. Stipulated contract time is 250 calendar days. Prevailing labor wage rates per hour are: iron workers, $2.00; crane operators, $2.25; pile driver operators, $2.25; cement finishers, $1.99½; truck drivers, over 1½ tons. $1.25; and common laborers, $1.40.

BIDS: Fourteen bids were received, ranging from the contract low of $269,869.50 to $550,192.00. Contract was awarded December 15, 1947.

LIST OF BIDDERS:

1. V. Barletta Co., Roslindale, Mass. (contract) $269,869.50
2. M & R Const. Corp., Boston, Mass. 279,789.50
3. Coleman Bros. Corp., Boston, Mass 309,953.75
4. Merritt-Chapman & Scott Corp., New London, Conn. 325,175.00
5. Munroe-Langstroth, Inc., N. Attleboro, Mass. 329,747.75
6. Northern Const. Co., Inc., Lawrence, Mass. 342,727.00
7. Berke Moore Co., Inc., Boston, Mass. 383,941.00
8. T. Stuart & Son Co., Watertown, Mass. 385,922.50
9. New England Foundation Co., Inc., Boston, Mass 391,833.00
10. J. F. Fitzgerald Const. Co., Boston, Mass. 393,310.50
11. Gahagan Const. Corp., New York, N. Y. 396,208.00
12. B. Perini & Sons, Inc., Framingham, Mass. 403,647.50
13. Spencer, White & Prentis, Inc., New York, N. Y. 447,906.50
14. Marinucci Bros. & Co., Dorchester, Mass. 550,192.00

			Unit Prices		
Item	Quantity	(1)	(2)	(3)
1 Facilities for resident engineer	lump sum	$6,000.00	$5,175.00	$8,000.00
2 Excavation	1,530 cy	10.00	18.00	6.00
4 Wet excavation	920 cy	20.00	20.00	8.00
5 Relocation of utilities	lump sum	500.00	1,000.00	2,000.00
6 Pile load tests	2 ea	2,000.00	1,000.00	2,000.00
7 Furnishing steel H piles	15,195 lf	3.85	3.80	4.25
8 Caps for steel H piles	249 ea	15.00	20.00	40.00
9 Splices for steel H piles	54 ea	60.00	70.00	200.00
10 Driving steel H piles	15,195 lf	2.25	1.30	3.00
11 Reinforcing steel	393,000 lb	.075	.10	.09
12 Class A base concrete	1,520 cy	16.00	20.00	22.00
13 Class A structure concrete	2,490 cy	29.00	28.00	32.00

Racine Street Bridge, Janesville, Wisconsin

OWNER: State Highway Commission of Wisconsin; C. H. Kirch, bridge engineer.

PROJECT: Construction of a 4-span Racine Street Bridge with a 30-foot roadway in the city of Janesville, Rock County, Wisconsin. Bridge is of continuous I-beam construction and measures 274 feet overall in length. Work involves removing old bridge, constructing and paving two 7-foot sidewalks, and installing lighting system.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by both rail and highway. Stipulated contract time is 310 days. Prevailing skilled labor wage rate ranges from $1.40 to $1.75 per hr.; semi-skilled, from $1.10 to $2.00 per hr.; and common wage rate is $1.10 per hr.

BIDS: Two bids were received, the contract low of $166,281.50 and $167,380.23. Contract was awarded about November 10, 1947.

LIST OF BIDDERS:

1. La Crosse Dredging Corp., Chicago, Ill. (contract) $166,281.50
2. L. G. Arnold, Inc., Eau Claire, Wis 167,380.23

			Unit Prices	
Item	Quantity		(2)
1 Removing old bridge	lump sum	$7,750.00	$12,500.00
2 Excavation for structure	860 cy	25.00	23.25
3 Sand-gravel fill	445 cy	2.00	2.00
4 Concr. masonry, grade "AA"	918.1 cy	50.00	48.50
5 Concr. masonry, grade "X"	147.6 cy	100.00	132.50
6 Bar steel reinforcing	72,270 lb	0.10	0.10
7 Steel fabric reinforcing	330 sy	1.00	0.50
8 Structural steel	337,050 lb	0.15	0.1375
9 Sheet lead	564 lb	0.50	0.35
10 Untr. timber test piling	lump sum	1,500.00	600.00
11 Untr. timber piling	3,260 lf	1.50	1.50
12 Floor drains	20 ea	40.00	35.00
13 Welded struct. steel bearings	11,780 lb	0.50	0.47
14 Lighting system	lump sum	4,000.00	4,250.00

Highway and Railroad Bridges, Newark, New Jersey

OWNER: State Highway Department, Trenton, New Jersey; Morris Goodkind, engineer.

PROJECT: Construction of three longitudinal steel beam deck bridges on Route 25, Section 34, in Newark, Essex County, New Jersey. Two bridges, the Magazine St. Bridge and the St. Charles Ct. Bridge are highway bridges, having concrete foundations, and the third, a railroad bridge, spanning the Central Railroad of New Jersey, has a foundation of concrete on timber piles. Both highway bridges measure 63 ft. long, 73 ft. wide and have roadway widths of 30 ft. and 35 ft. The railroad bridge measures 67 ft. 8 in. wide, and has roadway widths of 29 ft. and 30 ft.

CONDITIONS: All materials are to be furnished by contractor. Stipulated contract time is 150 working days from December 1, 1947. Access to job site is available by rail, water and highway. Prevailing wage rates are: skilled, $2.50 per hr.; semi-skilled, $2.125 per hr.; and common, $1.50 per hr.

BIDS: Seven bids were received, ranging from the contract low of $523,957.00 to $631,647.00. Contract was awarded October 29, 1947.

LIST OF BIDDERS:

1. Poirier & McLane Corp., New York, N. Y. (contract) $523,957.00
2. James Mitchell, Inc., Jersey City, N. J. 536,701.50
3. Union Bldg. & Const. Corp., Passaic, N. J. 547,808.00
4. El-Dorer Contracting Co., Irvington, N. J. 584,162.25
5. Kolyn Const. Co., Trenton, N. J. 607,542.30
6. Ole Hansen & Sons, Inc., Pleasantville, N. J. 619,209.25
7. Franklin Contracting Co., Newark, N. J. 631,647.00

			Unit Prices	
Item	Quantity		(1)	(2)
1 Foundation excavation	3,785 cy		$10.00	$14.00
2 Class B concrete in structures	760 cy		60.00	70.00
3 Class C concrete in structures	4,360 cy		50.00	42.00

Continued on next page

Highway and Railroad Bridges, Newark, New Jersey

Continued from preceding page

4	Concrete parapet	497 lf	7.00	10.00
5	Reinforcing steel in structures	299,600 lb	.14	.12
6	Structural steel	1,205,000 lb	.10	.11
7	Wrought iron blast plates	88,000 lb	.18	.22
8	Treated timber piles	1,460 lf	1.50	4.00
9	Waterproofing	3,150 sf	.50	1.50
10	Pipe railing	497 lf	7.00	8.50
11	Clearing site at Magazine St.	lump sum	9,000.00	9,000.00
12	Clearing site at St. Charles St.	lump sum	9,000.00	9,000.00
13	Clearing site at C. R. R. of N. J.	lump sum	9,000.00	14,570.00
14	Conduit system at Magazine St.	lump sum	1,000.00	1,300.00
15	Conduit system at St. Charles St.	lump sum	1,000.00	1,300.00
16	Conduit system at C. R. R. of N. J.	lump sum	1,000.00	1,200.00
17	Relocating waterline and hydrant	lump sum	500.00	900.00
18	Field office	lump sum	3,000.00	2,500.00

Big Thompson Project, Colorado

OWNER: Bureau of Reclamation, Denver, Colorado.

PROJECT: Construction of earthwork and structures for Aspen Creek siphon; Marys Lake power plant, penstock, spillway, and switchyard; Marys Lake Reservoir dikes and road relocation; Prospect Mountain conduit; and Estes power plant, penstock, and switchyard. This work is all included in the Big Thompson Project, Colorado.

CONDITIONS: Work is divided into five schedules, and each schedule may be awarded separately, at the option of the government. Contract time for Schedules 1 and 2 is 800 calendar days, and for Schedules 3, 4, and 5, 730 calendar days. Government furnished materials include sand and coarse aggregate for use in concrete; concrete, cast iron or clay sewer pipe; corrugated metal pipe culverts and corrugated connecting bands for joints; mineral surfaced roofing, structural steel framework for supporting roofs over the generator rooms of the power plants; bulkhead gates; track rails for crane runways and for transformer tracks; steel and cast iron pipe for permanent water supply, air piping, and vent piping; other materials that will become a part of the completed job.

Schedule 1—Estes Power Plant and Switchyard

DESCRIPTION: The Estes Power Plant will be located on the right bank of the Big Thompson River. It is to be 98 ft. x 145 ft., of reinforced concrete construction with structural steel and roof framing. It will house three main generator units, each consisting of a 16,667-kva. vertical shaft generator with direct-connected exciters, driven by a 21,000-horsepower turbine. It will contain a main-control room, a transformer and switchgear room, an electrical laboratory, a ventilating equipment room, a machine shop, an electrical shop, and a battery room. It will also be equipped with an 80-ton traveling crane, which will be furnished by the government. The switchyard will connect directly to the power plant by large metal accordion doors, and will be approximately 100 ft x 350 ft. The roof will be covered with 5-ply built-up coal-tar saturated felt roofing complete with gravel surfacing. The transformers and oil circuit breakers will be located in the switchyard, which will be surfaced with gravel. It will also contain switchgear and bus structures for which footings and foundations only are to be constructed. The terrazzo floor finish in the lobby and generator room, the linoleum in the control room, and the suspended ceiling over the mezzanine section of the power plant will be installed by the government.

BIDS: Two bids were received January 15, 1947 on Schedule 1. Contract was awarded to the low bidder.

1. Morrison-Knudsen Co. Inc. Boise, Idaho and Peter Kiewit Sons Co., Omaha, Nebraska (contract) $921,216.75
2. Winston Bros. Co. and Al Johnson Const. Co., Minneapolis, Minn. 1,024,278.00

	Item	Quantity	Unit Price (1	
1	Excavation, common	28,975 cy	$0	
2	Excavation, rock	9,435 cy	4	
3	Fill	27,590 cy	0	
4	Compacting fill	27,590 cy	0	
5	Furnishing and placing topsoil fill	6,000 cy	2	
6	Overhaul	3,000 st cy	0	
7	Dry-rock paving	3,500 sy	5	
8	Dumped riprap	1,200 cy	3	
9	Furnishing, placing gravel surfacing on switchyard	900 cy	6	
10	Furnishing and placing gravel or cr. rock for base crse. of road and parking-area surfacing	1,800 cy	6	
11	Watering base course	108,000 gal	0	
12	Furnishing, applying asphaltic mat. for prime coat	7,300 gal	0	
13	Furnishing and placing gravel or crushed rock for surf. crse.	800 cy	6	
14	Furnishing and applying asphaltic material for surf. crse.	15,000 gal	0	
15	Mixing, finishing, and rolling surface course	10,100 sy	0	
16	Furnishing, applying asphaltic material for sealcoat	2,600 gal	0	
17	Furnishing and applying coarse sand for seal coat	27 cy	14	
18	Constructing 6" dia. sewerpipe drains with uncemented joints	350 lf	2	
19	Constructing 8" dia. sewerpipe drains with cemented joints	980 lf	3	
20	Const. 12" dia. sewerpipe drains with cemented joints	475 lf	4	
21	Const 12" dia. corrugated-metal pipe culverts	120 lf	2	
22	Drilling holes for anchor, grouting bars in place	510 lf	2	
23	Concrete in power-plant substructure	3,800 cy	34	
24	Concrete in power-plant superstructure	1,575 cy	70	
25	Second-stage concrete in power plant	2,500 cy	29	
26	Concrete in blockouts	20 cy	90	
27	Placing bonded concrete floor finish	2,300 sy	4	
28	Concrete in switchyard foundations	775 cy	38	
29	Concrete in switchyard tunnel	278 cy	35	
30	Concrete in switchyard ducts	300 cy	32	
31	Concrete in retaining walls	650 cy	31	
32	Concrete in sidewalks	5,455 sf	0	
33	Concrete in combined curbs and gutters	1,180 lf	1	
34	Furnishing and handling cement	15,200 bbl	4	
35	Furnishing and placing reinf. bars ¾" dia. and larger	1,010,000 lb	0	
36	Placing metal sealing strips	1,400 lf	1	
37	Placing joint filler	350 sf	2	
38	Constructing control joints	440 lf	2	
39	Insulating reinf. bars and electrical metal conduits (price per intersection)	160 ea	3	
40	Placing coal-tar-saturated felt roofing, compl. with flashing	12,000 sf	0	
41	Placing 5-ply membrane waterproofing	1,200 sf	0	
42	Placing 2-ply membrane waterproofing	560 sf	0	
43	Damp proofing outside walls	1,550 sy	0	
44	Installing glass-block panels	1,680 sf	1	
45	Installing bulkhead gates	6,000 lb	0	
46	Installing gate guides, latches for bulkhead gates	4,500 lb	0	
47	Installing butterfly valves	216,000 lb.	0	
48	Erecting structural metal framework	210,000 lb	0	
49	Installing rails, ties, and ballast	190 track	8	
50	Installing rails in concrete	29,200 lb	0	
51	Installing cranes	132,500 lb	0	
52	Installing standard metal pipe, fittings, and valves less than 6" in size	45,100 lb	0	
53	Installing standard metal pipe, fittings, and valves 6" or more in size	70,000 lb	0	
54	Installing steel pipe railings	4,000 lb	0	
55	Installing embedded metal frames for openings in floors and walls	9,900 lb	0	
56	Installing metal gratings, floor plates, cover plates	26,900 lb	0	
57	Installing oil storage tanks	8,600 lb	0	
58	Installing pumps	4,200 lb	0	
59	Installing metal accordion doors	504 sf	1	
60	Installing metal swinging doors	750 sf.	1	
61	Installing metal fire doors	64 sf	1	
62	Installing metal-sash windows	160 sf	1	
63	Installing metal louvers	1,500 lb	0	
64	Installing metal inserts	3,500 lb	0	
65	Installing miscellaneous metalwork	21,400 lb	0	
66	Installing plumbing fixtures, appurtenant hardware	1,500 lb	0	
67	Installing embedded electrical metal conduit 1¼" or less in dia.	7,000 lf	0	
68	Installing embedded electrical metal conduit more than 1¼" and not larger than 3" in dia.	8,200 lf	1	
69	Installing electrical embedded metal conduit larger than 3" in dia.	500 lf	2	
70	Installing embedded electrical nonmetallic conduit	25,000 lf	0	
71	Installing ground wires and ground rods	1,600 lb	2	
72	Transporting freight of all kinds for the Government or its agents, other than the contractor, bet. the railroad station and the power-plant site.	1,660 ton	10	

Schedule 2—Marys Lake Power Plant and Switchyard

DESCRIPTION: The Marys Lake Power Plant will be located on the southwest side of Marys Lake. It will be of reinforced concrete construction with structural steel roof framing, approximately 62 ft. x 64 ft. It will house one main generating unit, station-service equipment, and an outlet-work and will contain a main-control room, a transformer room, a switchgear room, an oil storage room, an air compressor room and a battery room. The power plant will be equipped with a 50-ton traveling crane supplied by the government. The main generator unit will consist of a 9000-kva. vertical shaft generator with a direct-connected exciter, driven by an 11,300-hors

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Big Thompson Project, Colorado

Continued from preceding page

power turbine. The switchyard, 40 ft. x 90 ft., will connect directly to the power plant through metal accordion doors. The roof will be covered with 5-ply built-up coal-tar saturated felt roofing complete with gravel surfacing. Hydraulic and electrical apparatus will be installed by the government, but the contractor must place all concrete around the apparatus. Transformers and oil circuit breakers will be located in the switchyard, which will be surfaced with gravel. In addition, the switchyard will contain switchgear and bus structures for which footings and foundations only are to be constructed.

BIDS: Two bids were received January 15, 1947 on Schedule 2. Contract was awarded to the low bidder.

1. Morrison-Knudsen Co. Inc., Boise, Idaho, and Peter Kiewit Sons Co., Omaha, Nebraska (contract) $289,494.65
2. Winston Bros. Co. and Al Johnson Const. Co., Minneapolis, Minn. 322,556.00

	Item	Quantity	Unit Prices (1)	(2
73	Unwatering foundation for power plant	lump sum	$15,000.00	$28,300.00
74	Excavation, common	2,075 cy	0.65	0.92
75	Excavation, rock	4,160 cy	4.20	2.10
76	Excavation, rock, for keys for switchyard foundations	40 cy	30.00	40.00
77	Fill	1,130 cy	0.50	1.10
78	Compacting fill	1,130 cy	1.00	1.10
79	Dumped riprap	160 cy	3.00	5.75
80	Furnishing, placing gravel surfacing on switchyard	70 cy	6.00	5.00
81	Constructing 6" dia. sewerpipe drains with uncemented joints	80 lf	2.00	2.00
82	Drilling holes for anchor, grouting bars in place	420 lf	2.00	1.90
83	Concrete in power plant substructure	1,400 cy	44.00	37.00
84	Concrete in power plant superstructure	500 cy	75.00	106.00
85	Second-stage concrete in power plant	500 cy	33.00	17.50
86	Concrete in blockouts	5 cy	90.00	130.00
87	Placing lightweight concrete fill on floor	35 cy	20.00	30.00
88	Placing bonded concrete floor finish	900 sy	4.70	4.85
89	Concrete in switchyard foundations	70 cy	48.00	60.00
90	Concrete in switchyard ducts	15 cy	38.00	40.00
91	Concrete in retaining walls	50 cy	28.00	90.00
92	Furnishing and handling cement	4,600 bb	4.40	4.68
93	Furnishing, placing reinf. bars ¾" dia., larger	357,000 lb	0.12	0.12
94	Placing metal sealing strips	100 lf	1.10	1.50
95	Constructing control joints	120 lf	2.60	3.00
96	Insulating reinf. bars and electrical metal conduits (price per intersection)	60 ea	3.90	0.55
97	Placing coal-tar-saturated felt roofing, compl. with flashing	3,000 sf	0.20	0.16
98	Placing 2-ply membrane waterproofing	400 sf	0.20	0.16
99	Damproofing outside walls	500 sy	0.90	0.95
100	Installing glass-block panels	300 sf	1.50	2.20
101	Installing bulkhead gates	11,000 lb	0.09	0.06
102	Installing gate guides, latches for bulkhead gates	2,200 lb	0.21	0.08
103	Erecting structural metal framework	24,000 lb	0.13	0.06
104	Installing rails, ties, and ballast	75 trackf	8.00	10.00
105	Installing rails in concrete	17,150 lb	0.06	0.06
106	Installing crane and hoist	89,200 lb	0.06	0.06
107	Installing standard metal pipe, fittings, and valves less than 6" in size	14,600 lb	0.40	0.33
108	Installing standard metal pipe, fittings, and valves 6" or more in size	24,000 lb	0.22	0.2
109	Installing steel pipe railings	3,400 lb	0.35	0.22
110	Installing embedded metal frames for openings in floors and walls	3,150 lb	0.13	0.22
111	Installing metal gratings, floor plates, coverplates	10,800 lb	0.07	0.09
112	Installing oil storage tanks	7,500 lb	0.07	0.06
113	Installing pumps	2,100 lb	0.24	0.15
114	Installing metal accordion doors	300 sf	1.30	2.40
115	Installing metal swinging doors	212 sf	1.30	2.50
116	Installing metal fire doors	40 sf	1.30	2.40
117	Installing metal louvers	600 lb	1.30	0.33
118	Installing metal inserts	1,600 lb	0.37	0.33
119	Installing miscellaneous metalwork	4,500 lb	0.34	0.33
120	Installing plumbing fix., appurtenant hardware	380 lb	0.26	1.20
121	Installing embedded electrical metal conduit 1¼" or less in diameter	1,500 lf	0.80	1.20
122	Installing embedded electrical metal conduit, more than 1¼" and not larger than 3" in dia.	2,700 lf	2.30	1.50
123	Installing embedded elec. nonmetallic conduit	3,900 lf	0.53	1.30
124	Installing ground wires and ground rods	1,600 lb	2.00	0.36
125	Transporting freight of all kinds for Goverment or its agents, other than the contractor, between railroad station and power plant site	400 ton	10.50	9.00

Schedule 3—Marys Lake Penstock Gate Structure, Penstock and Spillway and Estes Penstock Gate Structure and Penstock

DESCRIPTION: (a) The Marys Lake penstock gate structure will be of reinforced concrete directly connected to the outlet portal of Rams Horn Tunnel and ending at the anchor block at the upper end of the steel penstock. A 3-barrel siphon spillway takes off from the right side and leads to a 6 ft. x 6 ft. wasteway conduit which conveys the water to Marys Lake Reservoir well way from the power plant. A fixed-wheel gate will control the flow into the penstock. A concrete building will enclose the portion of the gate structure containing the trashracks, fixed-wheel gate, and siphon spillway inlets. The penstock will be a 96-in. interior diameter steel pipe. (b) The Estes penstock gate structure will be a continuation of the transition at the outlet end of Prospect Mt. Tunnel and will provide separate entrances to the three penstocks. Three 6 ft. x 7½ ft. high-pressure gates will be installed as closures for the penstocks; a concrete building will enclose the portion over the gates. The penstocks will be 78-in. interior diameter steel pipe.

BIDS: Two bids were received January 15, 1947 on Schedule 3. Contract was awarded to the low bidder.

1. Morrison-Knudsen Co. Inc., Boise, Idaho, and Peter Kiewit Sons Co., Omaha, Nebraska (contract) $970,968.50
2. Winston Bros. Co. and Al Johnson Const. Co., Minneapolis, Minn. 976,957.00

	Item	Quantity	Unit Prices (1)	(2)
126	Excavation, common	18,200 cy	$2.75	$0.30
127	Excavation, rock	51,700 cy	2.75	2.00
128	Hauling excess rock excav. material from the Estes Power Plant penstock excav	50,000 cy	0.40	0.65
129	Backfill	28,050 cy	1.00	1.20
130	Compacting backfill	16,000 cy	4.00	3.40
131	Backfill earth and gravel	3,000 cy	2.25	2.60
132	Riprap	60 cy	7.00	11.00
133	Concrete in penstock gate structure, substructure, spillway, and penstock, anchors, and walls	3,922 cy	40.00	41.00
134	Concrete in penstock gate structure superstructure	245 cy	75.00	105.00
135	Furnishing and handling cement	6,200 bbl	4.40	4.68
136	Furnishing and placing reinf. bars ¾" dia. and larger	579,600 lb	0.12	0.13
137	Constructing control joints	100 lf	2.60	3.00
138	Placing coal-tar-saturated felt roofing compl. with flashing	1,900 sf	0.25	0.18
139	Damproofing outside walls	35 sy	0.90	1.00
140	Installing glass-block panels	55 sf	1.50	2.20
141	Installing fixed-wheel gate	4,000 lb	0.13	0.09
142	Installing fixed-wheel gate frames and guides	4,800 lb	0.20	0.09
143	Installing fixed-wheel gate hydraulic hoist	3,000 lb	0.20	0.09
144	Installing high-pressure gate	216,000 lb	0.14	0.08
145	Installing high-pressure and fixed-wheel gate hydraulic control apparatus	4,000 lb	0.13	0.33
146	Erecting structural metal framework	100 lb	0.13	0.07
147	Installing rails in concrete	3,200 lb	0.06	0.06
148	Installing overhead traveling crane	12,000 lb	0.06	0.06
149	Installing standard metal pipe, fittings, and valves less than 6" in dia	1,300 lb	0.40	0.33
150	Installing standard metal pipe, fittings, and valves 6" or more in dia	81,150 lb	0.22	0.21
151	Installing trashrack metalwork	41,900 lb	0.09	0.07
152	Installing penstocks	7,100,000 lb	0.045	0.057
153	Installing metal swinging door	195 sf	1.30	2.40
154	Installing metal-sash windows	255 sf	1.30	2.40
155	Installing metal louvers	20 lb	1.30	0.30
156	Installing downspouts and leader boxes	80 lf	1.30	1.40
157	Installing miscellaneous metalwork	30,775 lb	0.34	0.32

Schedule 4—Aspen Creek Siphon

DESCRIPTION: Aspen Creek Siphon is to be 10 ft. in width and 6 ft. in height, and of reinforced concrete construction. Walls are to be 12 in. in thickness and 400 ft. long. The inlet section contains a trashrack on the overflow channel.

BIDS: Four bids were received January 15, 1947 on Schedule 4, ranging from the contract low of $981,050 to $1,324,677.

1. Horner & Switzer, Denver, Colo. (contract) $981,050.00
2. Morrison-Knudson Co. Inc., Boise, Idaho and Peter Kiewit Sons Co., Omaha, Nebraska 1,102,755.00
3. S. S. Magoffin Co., Englewood, Colo. 1,107,385.00
4. Winston Bros. Co. and Al Johnson Const. Co., Minneapolis, Minn. 1,324,677.00

	Item	Quantity	Unit Prices (1)	(2)	(3)	(4)
158	Excavation, common, for structures	50,000 cy	$1.84	$1.75	$0.75	$1.07
159	Excavation, rock, for structures	85,000 cy	1.84	1.75	2.25	2.85
160	Backfill	102,000 cy	0.55	0.70	1.00	0.75
161	Compacting backfill	1,000 cy	5.00	3.50	4.00	6.90
162	Concrete in structures	11,100 cy	35.00	43.00	39.00	54.00
163	Furnishing and handling cement	16,600 bbl	4.20	4.40	4.70	4.68
164	Furnishing and placing reinf. bars ¾" dia. and larger	2,100,000 lb	0.097	0.11	0.116	0.12
165	Placing elastic filler in joints	60 sf	1.00	1.00	1.00	1.15
166	Placing metal water stops in joints	53,400 lb	0.15	0.13	0.30	0.25
167	Installing slide gate and hoist	1,300 lb	0.15	0.13	0.20	0.09
168	Installing miscellaneous metalwork	9,100 lb	0.15	0.34	0.25	0.33

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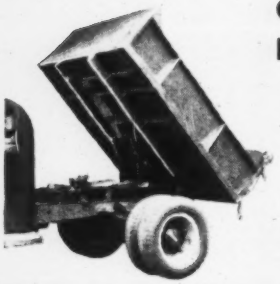

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Bank Protection along Red River, Shreveport, La.

OWNER: War Department, U. S. Engineers, New Orleans, La.

PROJECT: Bank protection job along the right bank of the Red River, in Vicinity of Shreveport, La. Work includes the laying of 4,450 lin. ft. of woven lumber mattress with rip-rap stone bank paving 10″ thick, and 4,300 lin. ft. of pile revetment. Woven lumber revetment is 100′ wide and balasted with rock. Pile revetment consists of a 2 row clump dike, 3 piles per clump, and 15 ft. on centers. Top of piles is 17 ft. above low water and driven to 30 ft. penetration on lumber foundation mattress 89 ft. wide.

CONDITIONS: Owner will furnish 900 piles, 60-67′ lengths, and 750 piles, 70-79′ lengths. Access to job site is available by rail, highway and water. Contract time is 150 calendar days. Prevailing union wage rates in the Shreveport area are $1.75 per hour for skilled labor; $1.50 for semi-skilled labor; and $.75 for common labor.

BIDS: Four bids were received, ranging from the contract low of $564,350 to $651,427.50. The contract award of January 13, 1947 is 24 percent above the government estimate of $456,824.

LIST OF BIDDERS:

1. W. P. McGeorge, Jr., Pine Bluff, Ark. (contract) $564,350.00
2. Patton-Tully Transportation Co., Memphis, Tenn. 585,630.00
3. J. Ray McDermott & Co., Inc., Harvey, La. 609,670.00
4. W. R. Aldrich & Co., Baton Rouge, La. 651,427.50

Item	Quantity	Government Estimate	Unit Prices (1)	Unit Prices (2)
1 Grading	160,000 cy	$0.21	$0.25	$0.30
2 Lumber mattress, pile revetment	3,800 sq	16.39	21.00	18.50
3 Lumber mattress, revetment	4,450 sq	19.76	27.00	23.50
4 Stone on mattress, pile revet., in dike	5,600 tn	6.18	7.20	7.80
5 Stone on mattress, revetment	8,900 tn	6.19	7.20	7.80
6 Stone in upper bank paving	15,600 tn	5.76	7.20	8.75
7 Gravel	6,700 tn	4.97	6.40	6.25
8 Placing piles	108,000 lf	0.557	0.60	0.66

Tully Dam, Royalston, Massachusetts

OWNER: U. S. Engineers, Boston, Massachusetts.

PROJECT: Construction of earth dam and appurtenant structures consisting of (a) the construction of a concrete lined tunnel and outlet channel, intake structure and intake channel, intake structure superstructure, and furnishing and installing all gates and equipment; (b) construction of an earth dam by the rolled fill method with an impervious core and upstream blanket, and random and pervious outer shells with dumped rock fill slopes; (c) construction of concrete spillway weir and training wall, including excavation of spillway approach channel and spillway chute; (d) construction of concrete arch bridge and a portion of relocated highway, culverts, gravel drives, gravel walks and gravel parking areas; (e) construction of utility building-field office, utilities and general landscaping work.

CONDITIONS: Contract time is 550 calendar days. Access to job site is by railroad and highway. Minimum wage rates specified are: bricklayers, $1.995 per hour; carpenters, $1.25; electricians, $1.50; ironworkers, structural, ornamental, reinforcing, $1.85; painters, brush, $1.25; painters, spray, $1.50; steamfitters, $1.50; operators of air-compressors (315 cu. ft. and over), $1.40; of bulldozers, $1.50; of hoists (3 or more drums), $1.90; and unskilled laborers, $1.05.

BIDS: Eight bids were received, ranging from the contract low of $762,545.00, awarded March 13, 1947, to $1,138,596.00.

LIST OF BIDDERS:

1. Kelleher Corp., Turners Falls, Mass. (contract) $762,545.00
2. Campanella & Cardi Const. Co., Hillsgrove, R. I. 830,289.50
3. Daniel O'Connell's Sons, Inc., Holyoke, Mass. 896,692.15
4. Carlo Bianchi & Co., Inc., Farmingham, Mass. 952,547.50
5. M. De Matteo Const. Co., Quincy, Mass. 964,810.75
6. The Savin Const. Co., Inc., East Hartford, Conn. 1,021,290.00
7. Geo. M. Brewster & Son, Inc., Bogota, N. J. 1,098,143.50
8. B. Perini & Sons, Inc., Farmingham, Mass. 1,138,596.00

Item	Quantity	Government Estimate	Unit Prices (1)	Unit Prices (2)
1 Diversion and care of river	lump sum	$15,000.00	$20,000.00	$15,000.00
2 Clearing and grubbing	lump sum	15,000.00	20,000.00	29,500.00
3 Common stripping	10,000 cy	60	.60	1.00
4 Common excavation—general	135,000 cy	50	.45	.60
5 Common excav.—highway grading	4,300 cy	60	.70	1.00
6 Common excav.—borrow, area "A"	31,000 cy	65	.50	.45
7 Common excav.—borrow area "C"	28,000 cy	65	.50	.45
8 Common excav.—borrow area "D"	16,300 cy	75	.65	.50
9 Common excavation—trench	1,100 cy	1.50	3.00	2.00
10 Rock excavation—open cut	69,000 cy	2.50	1.60	2.75
11 Mucking of overbreak material in open cut	3,000 cy	.40	.40	.40
12 Line drilling and broaching	12,000 sf	1.50	1.50	.50
13 Rock excavation—tunnel	600 cy	20.00	25.00	35.00
14 Mucking of overbreak material in tunnel	30 cy	3.00	3.00	3.00
15 Tunnel protection	50 lf	25.00	25.00	50.00
16 Dry packing	20 cy	12.00	20.00	50.00
17 Impervious fill	52,000 cy	.25	.15	.20
18 Random fill	36,000 cy	.22	.15	.15
19 Pervious fill	11,500 cy	.20	.15	.15
20 Gravel bedding	20,000 cy	.60	.70	.25
21 Compacted backfill	2,200 cy	1.25	1.00	1.00
22 Filter gravel	50 cy	5.00	3.00	12.00
23 Gravel for roads	3,800 cy	1.25	1.20	1.50
24 Dumped rock-fill	65,000 cy	.50	.80	1.00
25 Hand-placed riprap	600 cy	7.00	5.00	10.00
26 Grouted riprap	1,800 sy	5.50	4.50	10.00
27 Stone gutters	500 sy	2.25	3.00	6.00
28 Gravel filled drains	220 lf	1.25	4.00	3.00
29 Corrugated metal pipe, 10-inch	80 lf	2.00	3.00	2.00
30 Core drilling	360 lf	6.00	8.00	10.00
31 Ordinary drilling	1,100 lf	1.50	1.50	2.00
32 Pressure grouting	2,000 cf	2.00	4.00	3.00
33 Portland cement	5,000 bbl	3.40	3.25	3.50
34 Steel reinforceme lit	108,000 lb	.09	.08	.12
35 Concrete—tunnelning	280 cy	35.00	37.00	35.00
36 Concrete—intake structure and downstream portal	610 cy	38.00	33.00	30.00
37 Concrete—road bridge structures	660 cy	40.00	42.00	23.00
38 Concrete—spillway weir and miscellaneous structures	2,000 cy	18.00	27.00	20.00
39 Concrete backfill	50 cy	7.00	7.00	7.00
40 Intake structure superstructure	lump sum	12,000.00	20,000.00	17,500.00
41 Miscellaneous structural steel	15,000 lb	.20	.30	.25
42 Miscellaneous iron and steel	2,900 lb	.25	.35	.50
43 Miscellaneous wrought iron pipe	1,400 lb	.50	.40	1.00
44 Miscellaneous black steel pipe	1,400 lb	.35	.35	.90
45 Miscellaneous brass and bronze	200 lb	.00	1.50	2.00
46 Copper water stops	2,000 lb	180	1.50	1.50
47 Electric light and power system	lump sum	46,000.00	18,000.00	16,640.00
48 Exterior electrical work	lump sum	2,800.00	6,000.00	16,880.00
49 Gates and accessories	lump sum	5,000.00	65,000.00	29,500.00
50 Traveling crane	lump sum	5,000.00	10,000.00	7,362.00
51 Gasoline-electric standby unit	lump sum	15,500.00	4,000.00	3,075.00
52 Utility building—field office	lump sum	7,500.00	28,000.00	22,500.00
53 Water level recorder and accessories	lump sum	500.00	2,000.00	1,000.00
54 Flag pole and base	lump sum	500.00	1,000.00	300.00
55 Highway guard railing	3,600 lf	1.80	2.50	2.30
56 Guard fencing	2,600 lf	.60	1.25	.97
57 Bituminous material	23,000 gal	.18	.16	.13
58 Bituminous macadam road surface	10,000 sy	1.40	1.00	1.40
59 Tile gages	lump sum	300.00	1,500.00	1,500.00
60 Drilling and casing well	15 lf	20.00	20.00	30.00
61 Well-pump and accessories	lump sum	1,500.00	2,000.00	2,000.00
62 Brick manholes	2 ea	175.00	200.00	160.00
63 Galv. w. i. water pipe fittings, 2-in.	360 lf	1.00	1.50	1.20
64 Galv. w i. water pipe fittings, 2½-in.	1,000 lf	1.40	2.00	1.50
65 Septic tank	lump sum	225.00	1,500.00	1,500.00
66 Vitri. clay pipe, 4-in. open joints	400 lf	.30	1.00	1.50
67 Vitri. clay ppe, 4-in. mortar joints	60 lf	.40	1.25	1.50
68 Vitri. clay pipe, 6-in. open joints	160 lf	.45	1.25	1.60
69 Vitri. clay pipe, 6-in. mortar joints	750 lf	.60	1.50	1.60
70 Perf vitr clay pipe, 6-in mortar joints	75 lf	.80	2.00	2.00
71 Topsoil	2,100 cy	1.00	1.50	1.50
72 Fertilizing and seeding	4 ac	400.00	300.00	800.00
73 Chain link fence	45 lf	3.00	4.00	3.500
74 Settlement gages	lump sum	2,500.00	2,000.00	2,000.00
75 Maintenance of highway traffic	lumpsum	3,000.00	5,000.00	10,000.00

Locks No. 27, Chain of Rocks Canal, Mississippi River

OWNER: Corps of Engineers, War Department, St. Louis, Missouri; R. E. Smyser, Jr., District Engineer.

PROJECT: Construction of 2 navigation locks of reinforced concrete, levels and access road near the downstream end of

Continued on next page

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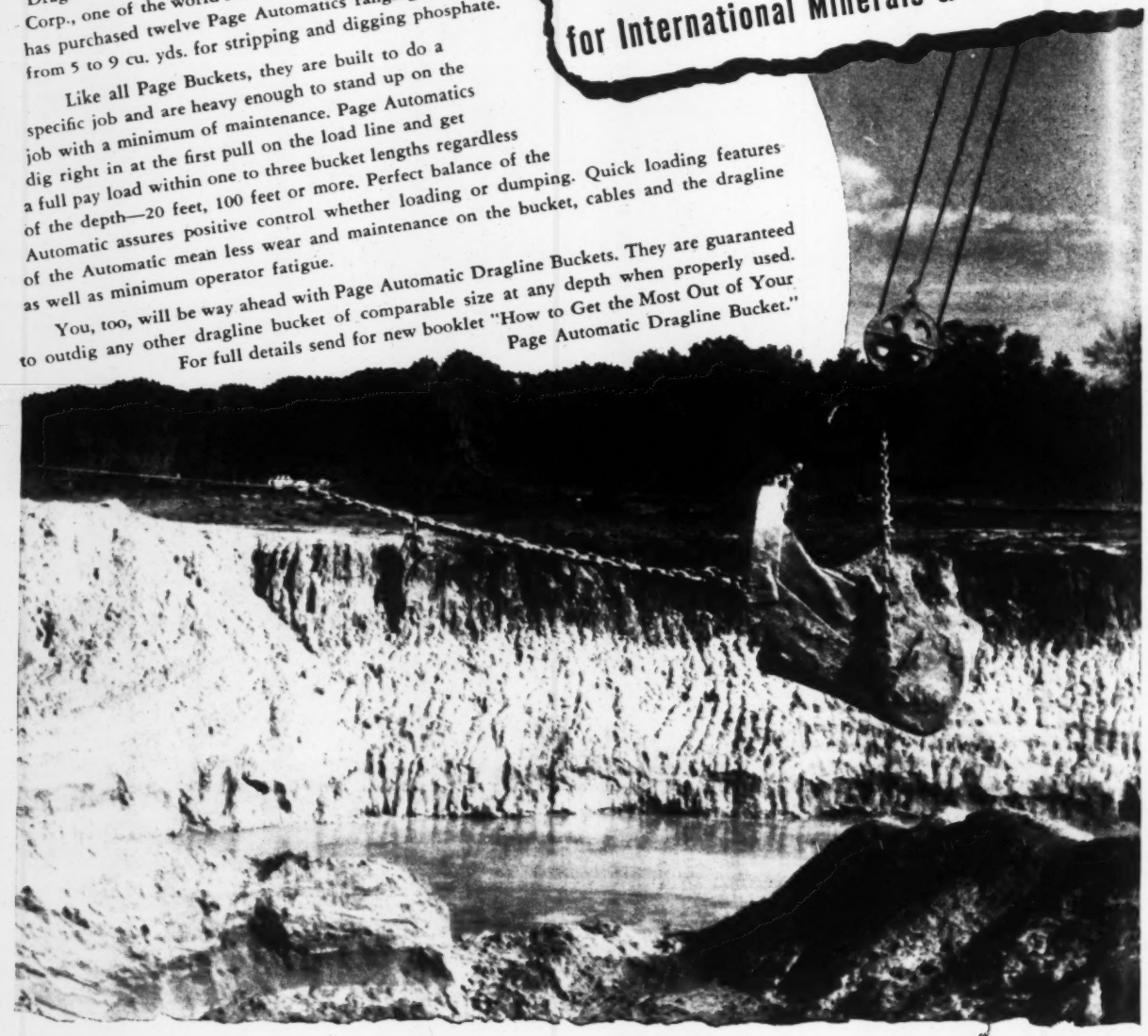

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DRAGLINE BUCKETS and WALKING DRAGLINES

Locks No. 27, Chain of Rocks Canal, Mississippi River

Continued from preceding page

the proposed Chain of Rocks Canal, near Granite City, Madison County, Mississippi River mile 184 above the Ohio River. The main lock will be 1200 ft. by 110 ft. and the auxiliary lock, 600 ft. by 110 ft. Lock walls to be approximately 92 ft. high. The main lock will be the longest lock in the Mississippi River system and will differ from others along the Mississippi in that the upstream gates will be of the double-leaf vertical-lift type. Each leaf will be 30 ft. high and each gate will consist of 2 leaves and will weigh about 450 tons. The downstream gates will be of the miter type and in the main lock each leaf will be 61 ft. long, 72 ft. high and weigh about 200 tons. In the auxiliary lock each leaf will be 43 ft. high and weigh 140 tons. The normal lift of the locks will vary from 5 to 11 ft., depending upon the river stage.

CONDITIONS: Locks 27 are to constructed at the lower end of a comtemplated lateral canal on left bank, or Illinois side of Mississippi River. The length of contract time, 1200 days, may witness some unusual flood conditions along the Mississippi and may affect the cost. Access to job site is available by rail, highway and water. Sand, gravel, crushed stone for concrete aggregate are to be furnished by the government. Skilled wage average is $2.25 per hr., common, $1.50 per hr.

BIDS: Three bids were received, ranging from the contract low of $16,626,000 to $19,782,365.36. The contract was awarded June 19, 1947.

LIST OF BIDDERS:

1. River Const. Corp., N. Y., N. Y. (contract) — $16,626,000.00
2. Pensacola Const. Co., Kansas City, Mo. — $17,219,279.90
3. United Const. Co., Winona, Minn. — $19,782,365.36

	Item	Quantity	Government Estimate	Unit Prices (1)	Unit Prices (2)
1	Cofferdam	1,732.17 lf	$870.00	$1,400.00	$1,125.00
2	Clearing	lump sum	15,000.00	26,000.00	53,000.00
3	Excavation; common	2,500,000 cy	.26	.30	.65
4	Excavation; rock	47,600 cy	4.00	10.00	8.00
5	Stripping	300,000 cy	.21	.30	1.15
6	Backfill	352,000 cy	.43	.27	1.00
7	Fill; crib, stone and sand	3,300 cy	1.30	3.00	6.00
8	Fill; sand, for cut off, inter. wall	14,500 cy	1.50	3.00	4.00
9	Embankment; levee	1,700,000 cy	.15	.20	.25
10	Embankment; esplanade	200,000 cy	.16	.30	.55
11	Dressing, seeding and mulching	90 a	83.00	300.00	600.00
12	Rip rap	21,500 cy	5.70	12.00	6.00
13	Stone protection; crushed or grav.	7,270 cy	5.10	5.00	5.00
14	Crushed stone; levee road	2,150 cy	4.35	4.00	10.00
15	Pavement; macadam base	11,560 sy	1.00	1.70	3.00
16	Pavement; bituminous macadam surf	11,560 sy	1.25	1.50	1.00
17	Drill, 1.5 in. grout holes under mason				
a	1st stage	6,000 lf	2.75	2.50	6.00
b	2nd stage	2,700 lf	3.00	2.70	7.00
c	3rd stage	1,000 lf	3.50	3.00	10.00
18	Pressure grouting under masonry	1,000 sack cmt	3.00	2.80	6.00
19	Piling; round timber vertical	21,100 lf	1.40	1.25	2.00
20	Piling; concrete	760 lf	6.00	7.00	8.00
21	Piling; steel sheet, type MA 22	2,400 sf	2.35	2.00	2.50
22a	Timber—hardwood	2.41 Mf bm	300.00	500.00	900.00
b	softwood	3.93 Mf bm	225.00	300.00	300.00
c	cribbing	187.0 Mf bm	200.00	200.00	250.00
23	Concrete				
a	Cl. "A" (Crse. agg. furn. by contr.)	6,550 cy	44.15	No Bid	80.00
b	Cl. "B" (Crse. agg. furn. by contr	385,600 cy	19.30	No bid	14.65
c	Slushing (Crse. agg. furn. by contr	50 cy	50.00	No bid	40.00
24	Cement	445,000 bbl	3.20	2.50	2.40
25	Absorptive form lining	620,500 sf	.19	.30	.30
26a	Steel—conc. reinf	2,935,000 lb	.10	083	.14
b	structural, wall armoring	717,800 lb	.12	105	.25
c	semi c.r., miscellaneous	125,400 lb	.28	18	.30
d	structural, miscellaneous	858,700 lb	.25	21	.35
e	corrosion resisting	13,950 lb	1.10	92	1.50
27a	Cast., ir. and steel (All cl. ex. spec.)	291,000 lb	.424	25	.40
b	special cast iron	102,000 lb	.15	20	.30
28	Water stops, copper	13,700 lb	1.10	1.00	1.60
29	Miscellaneous non-ferrous metal	8,000 lb	30	1.00	.75
30	Pipe; black steel, grouting (3")	8,200 lf	1.91	.70	2.60
31	Pipe; cast iron, flanged, 6"	100 lf	11.21	4.00	8.00
32a	Pipe; cast iron, threaded 1.5" dia	65 lf	4.45	1.00	1.90
b	2" dia	395 lf	3.90	1.20	2.20
c	2½" dia	130 lf	3.28	1.40	4.00
d	3" dia	409 lf	6.00	2.00	5.00
e	4" dia	320 lf	7.80	2.25	7.90
33a	Pipe; cast iron, water—3" dia	530 lf	2.36	2.00	5.00
b	4" dia	3,200 lf	2.62	1.40	7.20
34a	Pipe; cast iron, soil—4" dia	102 lf	3.48	2.00	4.30
b	5" dia	5 lf	4.82	2.00	6.00
c	6" dia	28 lf	6.60	2.50	7.80
d	8" dia	45 lf	10.00	4.00	14.50
35a	Pipe; std. steel, galvanized—½" dia	3,675 lf	65	60	50
b	¾" dia	24 lf	2.75	1.00	60
c	1" dia	1,084 lf	80	1.00	90
d	1¼" dia	340 lf	93	1.00	1.00
e	1½" dia	6,572 lf	80	75	1.30
f	2" dia	1,102 lf	2.20	1.00	1.70
g	3" dia	4,907 lf	1.64	2.00	3.50
h	4" dia	3 lf	37.00	3.00	6.00
36a	Pipe; std. steel, black—2" dia	15 lf	1.07	2.08	1.50
b	2½" dia	26 lf	1.69	2.00	2.00
c	3" dia	3 lf	2.21	2.00	2.60
d	4" dia	65 lf	9.00	2.00	4.00
e	6" dia	2,112 lf	5.56	3.00	6.50
f	8" dia	35 lf	11.40	6.00	9.00
g	10" dia	70 lf	12.60	7.00	14.00
37a	Pipe; w. i., galv.—¾" dia	81 lf	1.55	1.00	1.20
b	1" dia	222 lf	1.60	1.00	1.50
c	1½" dia	41 lf	2.75	1.00	2.60
d	2" dia	60 lf	4.40	1.20	3.50
38a	Pipe; w. i., black ¾" dia	60 lf	.38	1.00	.90
b	1½" dia	42 lf	93	1.00	2.00
c	3" dia	112 lf	2.59	2.00	6.00
39	Pipe; ex. hy. brass, ½" dia	935 lf	1.85	1.20	5.00
40a	Pipe; vitrified clay, std.—4" dia	328 lf	1.10	1.00	1.00
b	5" dia	191 lf	1.23	1.00	1.25
c	6" dia	781 lf	1.35	1.00	1.35
d	8" dia	10 lf	2.00	1.20	2.00
e	10" dia	120 lf	2.75	1.50	3.00
41	Pipe; farm tile, 6" dia	773 lf	.75	1.00	1.00
42	Pipe; corrugated, galv., 48" dia	635 lf	22.00	15.00	30.00
43	Inlet, float well supply	4 ea	20.00	70.00	260.00
44	Inlet A	20 ea	75.00	50.00	50.00
45	Inlet B	33 lf	25.00	15.00	15.00
46	Piezometer system, complete	lump sum	650.00	1,000.00	1,500.00
47	Piping; lock unwater. sys., compl.	lump sum	16,100.00	12,000.00	25,800.00
48	Piping, sill flushing, compl. (36" dia.)	lump sum	2,180.00	1,000.00	4,800.00
49a	Backwater valve, compl.—6" dia	1 ea	50.00	60.00	1,768.00
b	8" dia	1 ea	75.00	80.00	2,500.00
50	Float well valve and equipment	lump sum	812.00	2,500.00	3,200.00
51	Sluice gate, lock unwater. and sill flushing, 36" dia	4 ea	1,800.00	2,000.00	2,000.00
52a	Diaphragms—48" corr. pipe	14 ea	195.00	400.00	200.00
b	For 10" gas main	3 ea	100.00	300.00	130.00
53	Drain. str., sluice gate; compl., 48" dia	lump sum	6,580.00	40,000.00	6,000.00
54	Drainage stop log structure, compl.	lump sum	910.00	2,000.00	3,060.00
55	Sprinkler heads; lawn	329 ea	2.60	3.00	2.00
56	Rack; fire hose	6 ea	157.00	100.00	150.00
57a	Floor grating—steel	504 sf	4.00	3.00	6.00
b	aluminum	486 sf	5.50	5.50	12.00
58a	Floor plate—steel	2,500 sf	2.30	2.50	4.00
b	abrasive	2,152 lb	45	375	60
59	Tile gage	382 lf	12.00	25.00	30.00
60	Handrailing	70,000 lb	50	36	75
61	Guard post	88 ea	5.00	12.00	12.00
62	Guard rail	3,675 lf	1.60	2.00	1.80
63	Fence, complete	444 lf	1.70	3.00	3.50
64	Curb and gutter	1,137 f	3.00	1.00	5.00
65	Wooden gallery door	11 ea	70.00	200.00	90.00
66	Door; transformer vault; complete	lump sum	150.00	250.00	350.00
67	Culvert valve pit cover, complete	7 ea	1,400.00	2,000.00	8,900.00
68a	Miter gate (two leaves)—main lock	lump sum	211,000.00	205,874.00	230,000.00
b	auxiliary lock	lump sum	153,000.00	152,000.00	165,000.00
69a	Lift gate—upst. leaf (excl. react. rollers)	2 ea	101,000.00	116,000.00	125,000.00
b	Downstream leaf (excl. react. rollers)	2 ea	145,000.00	167,000.00	180,000.00
70	Culvert tainter valve; compl.	7 ea	9,400.00	9,900.00	11,000.00
71	Lock bulkhead unit	16 ea	18,600.00	19,000.00	20,000.00
72	Culvert bulkhead	7 ea	3,300.00	4,500.00	5,000.00
73a	Relief valve cable mark 30/22-10	4 ea	35.00	100.00	120.00
b	mark 30/22-11	2 ea	20.00	80.00	96.00
74a	Floating mooring bitt—drum	27 ea	1,050.00	1,300.00	2,025.00
b	reaction roller assembly	27 ea	726.00	600.00	910.00
75	Walkway bridge, complete	2 ea	9,900.00	12,900.00	15,750.00
76	High water dam	lump sum	13,200.00	13,900.00	16,800.00
77	Culvert bulkhead recess cover	lump sum	500.00	1,000.00	125.00
78a	Lift gate mach., compl.—downstream leaf	4 ea	42,250.00	34,000.00	60,000.00
b	upstream leaf	4 ea	42,100.00	34,000.00	60,000.00
79a	Miter gate mach.; Compl.—E. and interm. walls	3 ea	40,400.00	35,500.00	55,000.00

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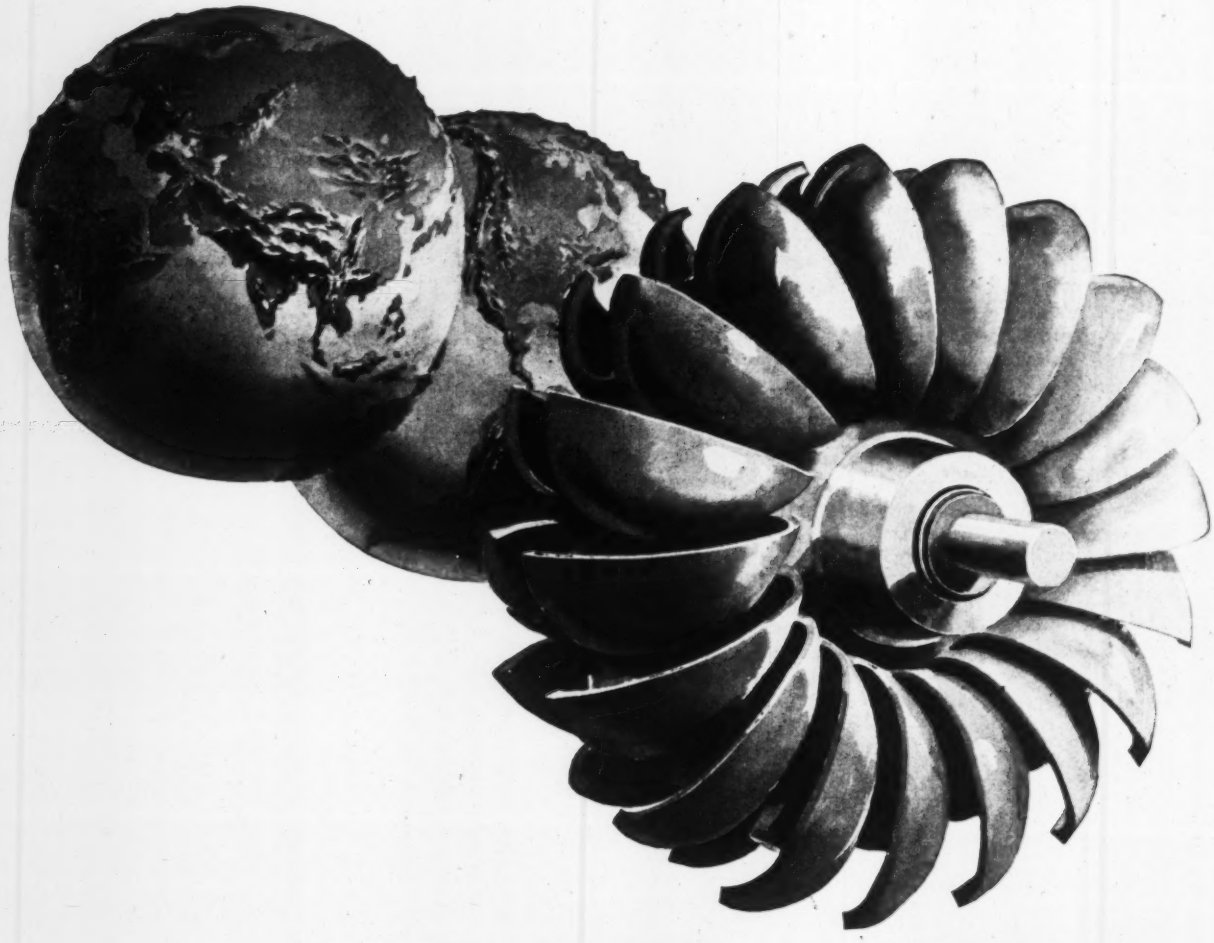

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Locks No. 27, Chain of Rocks Canal, Mississippi River

Continued from preceding page

	b west wall	1 ea	39,100.00	35,500.00	54,000.00
80	Walkway bridge machine	4 ea	8,000.00	8,100.00	13,000.00
81a	Culv. tainter valve mach., compl.—E. and interm. walls	5 ea	20,400.00	15,700.00	22,500.00
	b west wall	2 ea	20,000.00	15,700.00	22,500.00
82	Lift gate reaction rollers, compl.	24 ea	2,700.00	2,600.00	4,100.00
83a	Spare parts—miter gate mach.	lump sum	10,800.00	6,500.00	12,500.00
	b lift gate mach	lump sum	8,500.00	4,800.00	16,000.00
	c tainter valve mach	lump sum	1,500.00	1,000.00	35,000.00
	d walkway bridge mach	lump sum	2,280.00	1,400.00	4,500.00
	e reaction rollers	lump sum	2,240.00	3,000.90	4,000.00
84	Stiffleg derrick	2 ea	12,400.00	35,000.00	84,000.00
85	Hoist, and operating equip.	2 ea	14,600.00	17,000.00	41,000.00
86	Lock bulkhead; pickup	lump sum	12,900.00	20,800.00	25,600.00
87	Culv. bulkhead hand. equip.	lump sum	6,160.00	4,500.00	7,200.00
88	Culv. bulkhead; pickup	lump sum	510.00	1,560.00	1,950.00
89	Nappe pickup strongback	lump sum	650.00	1,870.00	2,250.00
90a	Counterweights, compl.—upstream leaf	4 ea	5,400.00	4,300.00	5,100.00
	b downstream leaf	4 ea	10,000.00	6,600.00	7,550.00
91a	Pumps, compl.—lock unwatering	2 ea	7,420.00	9,000.00	8,500.00
	b fire	1 ea	2,810.00	3,000.00	4,260.00
	c crossover	7 ea	1,440.00	1,400.00	2,345.00
	d culvert valve unwatering	1 ea	1,490.00	1,500.00	7,400.00
92	Lock conduit sys.	lump sum	29,500.00	50,000.00	60,300.00
93	Electrical grounding sys.	lump sum	7,000.00	2,000.00	13,200.00
94	Incoming power line	lump sum	6,000.00	10,000.00	6,700.00
95	Esplanade conduit sys.	lump sum	29,600.00	20,000.00	18,700.00
96	Air compressor; compl.	lump sum	1,840.00	2,500.00	3,720.00
97	Fuel oil supply system	lump sum	2,070.00	1,500.00	3,310.00
98	Gasoline supply system	lump sum	912.00	1,000.00	1,940.00
99	Lift truck and platforms	lump sum	762.00	800.00	1,000.00
100	Hoist; rachet type	3 ea	103.00	80.00	100.00
101	Chain hoist	lump sum	340.00	560.00	300.00
102a	Jacks—hydraulic jacks	lump sum	209.00	60.00	400.00
	b push and pull	lump sum	121.00	100.00	125.00
103	Miscellaneous plumbing	lump sum	1,650.00	1,000.00	2,120.00
104	Permanent buildings, complete	lump sum	245,300.00	211,000.00	137,400.00
105	Temporary buildings	lump sum	26,400.00	25,000.00	30,000.00
Alternate					
23	Concrete				
	a Class "A" (Coarse Aggregate furnished by Government)	6,550 cy	42.20	35.00	77.25
	b Class "B" (Coarse Aggregate furnished by Government)	385,600 cy	17.35	17.80	12.70
	c Slushing (Coarse Aggregate furnished by Government)	50 cy	48.00	50.00	39.00

Plus cost of Aggregate furnished by Government.

2. Morrison-Knudsen and M. H. Hassler, Santa Ana, Cal. 859,658.00
3. Bressi and Bevanda Constructors, Los Angeles, Cal. 942,503.00
4. L. A. and R. S. Crow and W. R. Schriver, Los Angeles, Cal. 978,735.00
5. Fredrickson and Watson Constr. Co., Oakland, Cal. 981,210.50
6. Haddock Engineers, Ltd., Oceanside, Cal. 1,063,107.00
7. A. Teichert and Sons, Inc., Sacramento, Cal. 1,082,705.00
8. Guy F. Atkinson Co., South San Francisco, Cal. 1,184,760.00
9. Piombo Constr. Co., San Francisco, Cal. 1,218,594.00
10. Peter Kiewit Sons Co., Omaha, Neb. 1,222,485.00
11. Macco Corp., Clearwater, Cal. 1,360,711.00

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Diversion and care of water during const.	lump sum	$3,650.00	$5,000.00	$2,600.00
2	Clear and grub	lump sum	300.00	2,750.00	2,000.00
3	Stripping	80,000 cy	.12	.16	.18
5	Common excav., unclassified	500,000 cy	.114	.175	.23
6	Struct. excav., unclassified	15,000 cy	.90	2.00	.90
7	Borrow excav., unclassified	1,550,000 cy	.166	.175	.23
8	Blasting	1,000 cy	.90	2.25	1.25
9	Embankment	1,350,000 cy	.036	.06	.08
10	Rolling, one tractor with one 8-ft. width tamping roller	1,200 hr	8.40	15.00	8.00
11	Compacted backfill	6,000 cy	1.80	2.50	2.40
12	Uncompacted backfill	1,000 cy	1.20	.40	.90
13	Struct. concr.	1,400 cy	54.92	55.00	60.00
14	Paving concr	700 cy	36.54	30.00	30.00
15	Misc. concr	160 cy	35.88	100.00	50.00
16	Steel reinf	270,000 lb	.12	.09	.09
17	Metal water stop	350 lf	1.85	3.50	1.50
18	Expansion joint filler	1,200 sf	.41	1.00	.40
19	Gravel blanket	2,600 cy	5.65	6.70	6.00
20	Rock paving	160 sq	60.00	48.00	35.00
21	Grouting	160 cy	65.00	18.00	15.00
22	Riprap	2,000 cy	8.00	3.25	8.00
23	Quarry rock or cobbles	1,300 cy	5.00	8.00	6.00
24	Tile drain	110 lf	1.45	4.50	3.00
25	Road surfacing, graded agg.	5,300 cy	6.25	4.60	4.50
26	Install. of equip. furnished by U. S.	60,000 lb	.25	.12	.08
27	Elec. systems	lump sum	1,820.00	6,500.00	1,500.00
28	Struct. steel	10,000 lb	.34	.40	.20
29	Misc. metal work	10,000 lb	.56	.65	.35
30	Precast concr. pipe, 48"	124 lf	16.50	22.00	7.00
31	CMP EY inch	50 lf	9.60	12.00	8.00
32	Recorder house	lump sum	2,360.00	1,500.00	2,000.00
33	Staff gages	175 lf	5.00	4.00	10.00
34	Gate house Big Dry Creek Outlet	lump sum	3,752.00	2,000.00	750.00
35	Gate house Little Dry Creek Outlet	lump sum	3,752.00	2,000.00	1,500.00
36	Water for compaction	50,000 gal	1.25	1.50	1.20
37	Port. cement at mixing plant	3,500 bbl	4.00	3.80	4.00
38	Rolling ea. addnl. 8-ft. width tamping roller	1,200 hr	2.40	2.00	2.50

Big Dry Creek Reservoir, California

OWNER: U. S. Engineers, Sacramento, California.

PROJECT: Construction of an earthfill flood control dam, canals and spillways. Total length of Big Dry Creek Reservoir is to be 18,800 ft., and maximum height to be 42 ft. above natural ground level. Top widths of various sections of earthen dams and dikes in project will range from 15 to 25 ft. The project includes the construction of Dry Creek dam 2,500 ft. long with dike 16,500 ft. long connecting Dry Creek and Big Dry Creek and is designed to protect Clovis and Fresno districts from flood danger. Reservoir will control a maximum flood of 22,800 acre ft. of water with an estimated inflow of 17,000 cu. ft. a second for 8 days, or 58% more volume than maximum historical flood record.

CONDITIONS: Contractor is to install 60,000 lbs. of equipment furnished by United States. Access to job site is available by both rail and highway. Contract time is 15 months. Skilled labor wage rates are $1.375 per hr.; semi-skilled, $1.15 per hr., and common, $1.15 per hr.

BIDS: Eleven bids were received, ranging from the contract low of $762,895.80 to $1,360,711. Contract was awarded about March 31, 1947.

LIST OF BIDDERS:

1. H. Earl Parker, Marysville, Cal. (contract) $762,895.80

Main Embankment of the Garrison Dam, Bismarck, N. D.

OWNER: War Department Corps of Engineers, Garrison District, Bismarck, North Dakota; John S. Seybold, District Engineer.

PROJECT: Excavation and construction of rolled earth-filled main embankment of the Garrison Dam near Riverdale, North Dakota on the Missouri River. Work includes moving 11,000,000 cu. yds. of earth on the west side of the Missouri, first piece of the dam itself; building and lining a test diversion tunnel on the west side; driving 380,000 sq. ft. of sheet piling to prevent seepage downstream under the dam; and stockpiling an estimated 390,000 cu. yds. of lignite coal which they will uncover. This contract comprises only about one-seventh of the dirt which will have to be removed before the dam is completed.

CONDITIONS: Government will furnish all coarse and fine concrete aggregate and sand for grouting f.o.b. Stanton, N. D.; steel sheet piling as required for East Abutment f.o.b. Riverdale, N. D., and all material required for crusher blocks testing instruments. Access to job site is by rail and highway. Government is constructing a temporary construction bridge at the damsite across Missouri River to be completed by Janu-

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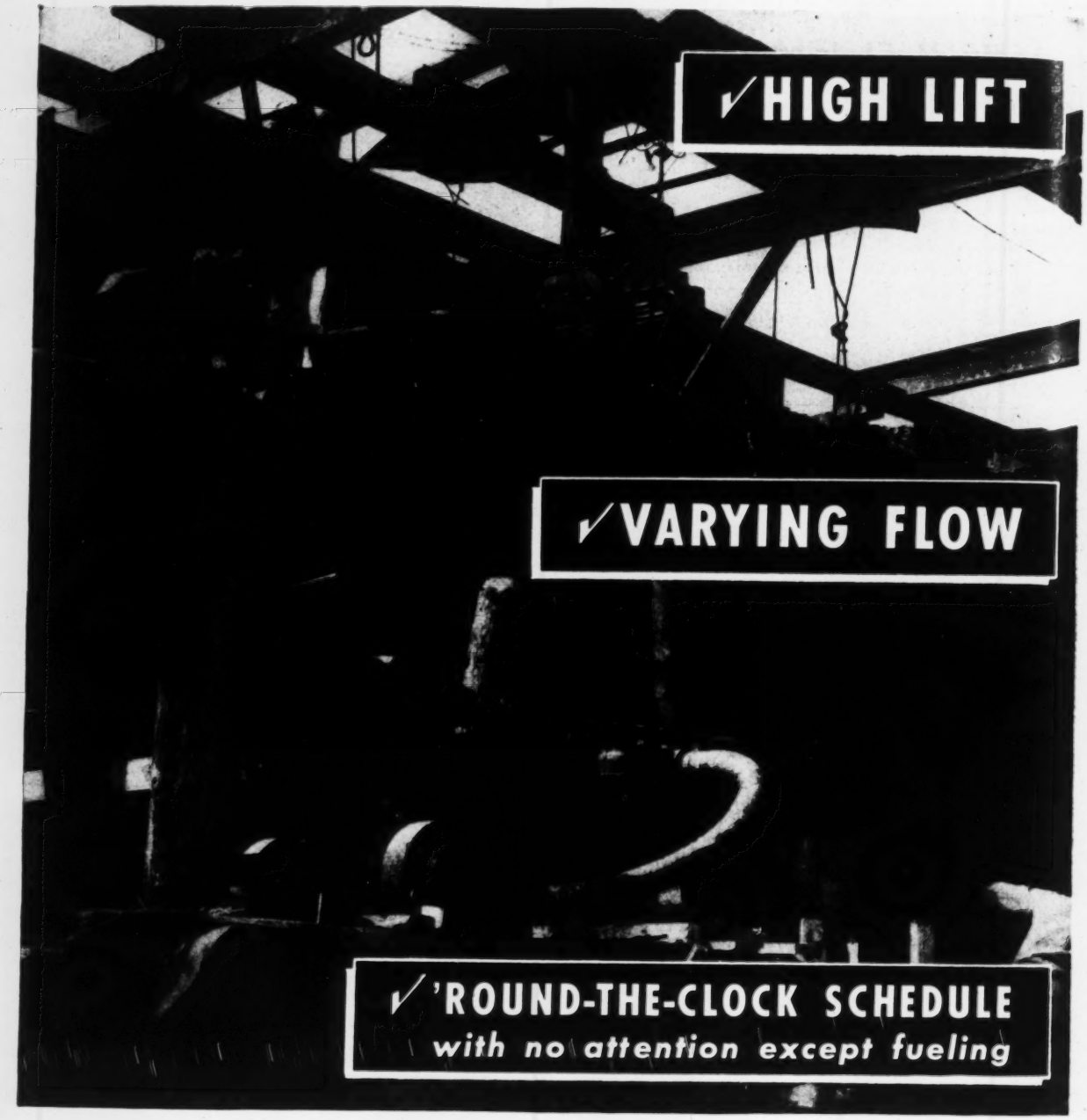

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Main Embankment of the Garrison Dam, Bismarck, N. D.

Continued from preceding page

ary 1, 1948. Government has constructed an access road from the construction bridge eastward to connect with U. S. Highway No. 83. Highway facilities west of the Missouri River are limited to secondary county roads connecting with North Dakota Highway No. 25. Stipulated contract time is 785 calendar days, or completion by November 12, 1949. Minimum wage rates specified are: power equipment operators, $.90 to $1.50 per hour; ironworkers, $1.75; carpenters, $1.45; electricians, $1.65; cement finishers, $1.35; mechanics, $1.40; miners, $1.30; air tool operators, $.90; tunnel laborers, $.90; and unskilled laborers, $.85.

BIDS: Eight bids were received, ranging from the contract low of $6,349,830 to $11,850,929. Contract was awarded September 12, 1947.

LIST OF BIDDERS:

1. H. N. Rodgers & Sons Co., Memphis, Tenn.
   Forcum-James Co., Dyersburg, Tenn.
   S. K. Jones Const. Co., Memphis, Tenn. (contract) $6,349,830
2. United Construction Co., Winona, Minn. 7,592,087
3. Garrison Constructors, Sioux City, Iowa 7,771,700
4. S. J. Groves & Sons Co., Minneapolis, Minn.
   C. F. Lytle Co., Sioux City, Iowa
   Bowen & McLaughlin, Phoenix, Ariz. 7,953,785
5. Mittry Brothers Const. Co., Los Angeles, Calif. 8,774,444
6. Morrison Knudsen Co., Inc., Boise, Idaho
   Macco Corporation, San Bruno, Calif.
   Peter Kiewit Sons Co., Omaha, Nebraska 9,377,043
7. Guy F. Atkinson Co., San Francisco, Calif.
   Bressi & Bevanda Constructors, Inc., Los Angeles, Calif.
   A. Teichert & Son, Inc., Sacramento, Calif.
   W. E. Kier Const. Co., Los Angeles, Calif. 9,886,696
8. George M. Brewster & Son Inc., Bogota, N. J. .. 11,850,929

Item	Quantity	Unit Prices: Government Estimate	(1)	(2)
1 Clearing and Grubbing	Lump Sum	$84,400.00	$85,000.00	$277,960.10
2 Stripping	145,000 cy	.34	.40	.35
3 Excavation—Intake & Powerhouse Area	9,625,000 cy	.38	.36	.46
4 Excavation—Outlet Channel Area	389,000 cy	.41	.36	.46
5 Excavation—Intake Channel Area	1,145,000 cy	.43	.36	.42
6 Excavation—Trench	453,000 cy	.27	.46	.46
7 Excavation—Lignite Salvage	300,000 cy	.48	.55	.70
8 Rock Salvage	100,000 cy	1.74	.25	.01
9 Pumping	30,000 Mil f gal	3.54	5.00	1.50
10 Rolled Fill—Impervious & Random	10,250,000 cy	.13	.04	.05
11 Rolled Fill—Pervious	805,000 cy	.10	.04	.05
12 Water for Compaction	123,000 M gal	2.32	1.60	.75
13 Additional Rolling—2 Passes	920,000 sq	.037	.015	.02
14 Lignite Stockpiling	390,000 cy	.073	.04	.01
15 Lignite Compaction—Roller; 2 Passes	193,000 sq	.046	.02	.02
16 Lignite Compaction—Tractor; 2 Passes	150,000 sq	.09	.02	.03
17 Lignite Protective Fill	90,000 cy	.21	.04	.25
18 Furnishing Steel Sheet Piling	31,000 lf	1.74	1.84	3.22
19 Driving Steel Sheet Piling	286,400 lf	1.26	1.00	.96
20 Settlement Gage—13 Ft. Length	16 ea	980.00	150.00	510.00
21 Settlement Gage—Additional Length	800 lf	28.60	3.00	14.60
23 Tunnel Excavation	11,200 cy	21.62	22.00	16.04
24 Timber Support	30 Mf bm	442.50	300.00	405.00
25 Furnishing Structural Steel Support	1,585,000 Lb	.13	.09	.12
26 Installing Structural Steel Support	1,400,000 Lb	.075	.065	.06
27a Drilling—Concrete	100 lf	2.65	5.00	14.45
27b Drilling—Ft. Union	2,000 lf	2.60	1.00	3.50
28 Grout Pipe	600 lf	1.68	5.00	3.28
29 Pressure Grouting	5,000 ef	2.22	3.00	3.50
30 Concrete Tunnel Lining	930 cy	55.65	85.00	74.50
31 Steel, Reinforcement	100,000 lf	.14	.10	.18
32 Portland Cement	3,060 bbl	5.58	4.50	5.00
33 Permanent Tunnel Drain	450 lf	2.50	3.00	9.39
34 Embedded Electrical Conduit	1,000 lb	1.40	.50	2.40
35 Vitrified Clay Pipe—12 Inch	255 lf	4.20	3.00	10.88
36 Vitrified Clay Pipe—18 Inch	276 lf	7.10	5.00	16.00
37 Vitrified Clay Pipe—24 Inch	500 lf	10.37	7.00	20.00
38 Bank-Run Gravel	2,300 cy	1.08	1.00	1.67
39 Manhole—8 Ft. Depth	5 ea	304.00	500.00	600.00
40 Manhole—Additional Depth	47 lf	18.50	25.00	20.00

Delta-Mendota Intake Canal and Tracy Pumping Plant, Central Valley, Calif.

OWNER: Bureau of Reclamation, Antioch, California; O. G. Boden, Construction Engineer.

PROJECT: Construction of Delta-Mendota intake canal, Tracy pumping plant, and discharge lines, part of the Central Valley Project in Central Valley, California. The 2.5 mile Delta-Mendota intake canal will carry up to 4,600 cu. ft. of Sacramento River water a second from the Delta Cross-Channel to the Mendota pool. Released from the pool through existing irrigation systems, the water will irrigate the Lower San Joaquin Valley crop lands. This intake canal is one of a system of canals on the Central Valley Project, which will have a total length of more than 400 miles and will furnish water to 2,100,000 acres of land requiring a full or a supplemental supply for irrigation purposes. The canal also will supply water for municipal and industrial uses. The pumping plant near Tracy will force water uphill from the Delta-Mendota intake canal through 3-mile long, 15-foot pipes to a height of approximately 200 feet where it will empty into the beginning of the canal and send the water flowing for a distance of 120 miles through the Delta-Mendota Canal along the west side of the San Joaquin Valley. The pumping plant structure, a railroad and highway culvert, pipe anchors and the surge tank foundations will be built on piles driven to a depth of about 42 feet.

CONDITIONS: Access to job site is available by rail and highway. Stipulated contract time is 960 days. Prevailing skilled labor wage rate is $1.50 per hr.; semi-skilled and common, $1.40 per hr.

BIDS: Four bids were received, ranging from the contract low of $5,888,695.00 to $7,395,104.00. Contract was awarded June 27, 1947.

LIST OF BIDDERS:

1. Stolte, Inc., Oakland, Calif., United Concrete Pipe Corp., and Ralph A. Bell, Monrovia, Calif., and Duncanson Harrelson Co., Oakland, Calif. (contract) $5,888,695.00
2. Guy F. Atkinson Co., So. San Francisco, Calif., W. E. Kier Constr. Co., San Diego, Calif., Bressi and Bevanda Constructors, Inc., Los Angeles, Calif., and A. Teichert & Son, Inc., Sacramento, Calif. 6,139,222.50
3. George Pollock Co., Sacramento, Calif., Macco Corp., Clearwater, Calif., and M & K Corp., San Francisco, Calif. 6,977,744.00
4. Morrison-Knudsen Co., Inc., Los Angeles, Calif., M. H. Hasler, Santa Ana, Calif., and Peter Kiewit Sons & Co., Omaha, Neb. 7,395,104.00

Item	Quantity	Unit Prices: (1)	(2)	(3)
Schedule No. 1				
1 Removing existing piling	lump sum	$3,040.00	$2,000.00	$1,000.00
2 Unwatering foundations for railroad and highway culvert	lump sum	20,000.00	60,000.00	75,000.00
3 Unwatering foundations for pump. plant site	lump sum	81,000.00	100,000.00	100,000.00
4 Excavation for canal	3,817,000 cy	0.25	0.315	0.36
5 Excavation for canal structures	72,300 cy	0.55	0.65	1.25
6 Excav. for pump.-plant struct.	450,000 cy	0.55	0.75	1.25
7 Excav. for pump discharge pipes	62,000 cy	0.55	0.75	0.66
8 Backfill	200,000 cy	0.30	0.40	0.26
9 Compact. backfill for struct.	68,000 cy	2.20	2.75	2.00
10 Compacting backfill for steel discharge lines	30,500 cy	3.00	4.00	2.00
11 Riprap	2,550 cy	10.00	10.00	14.50

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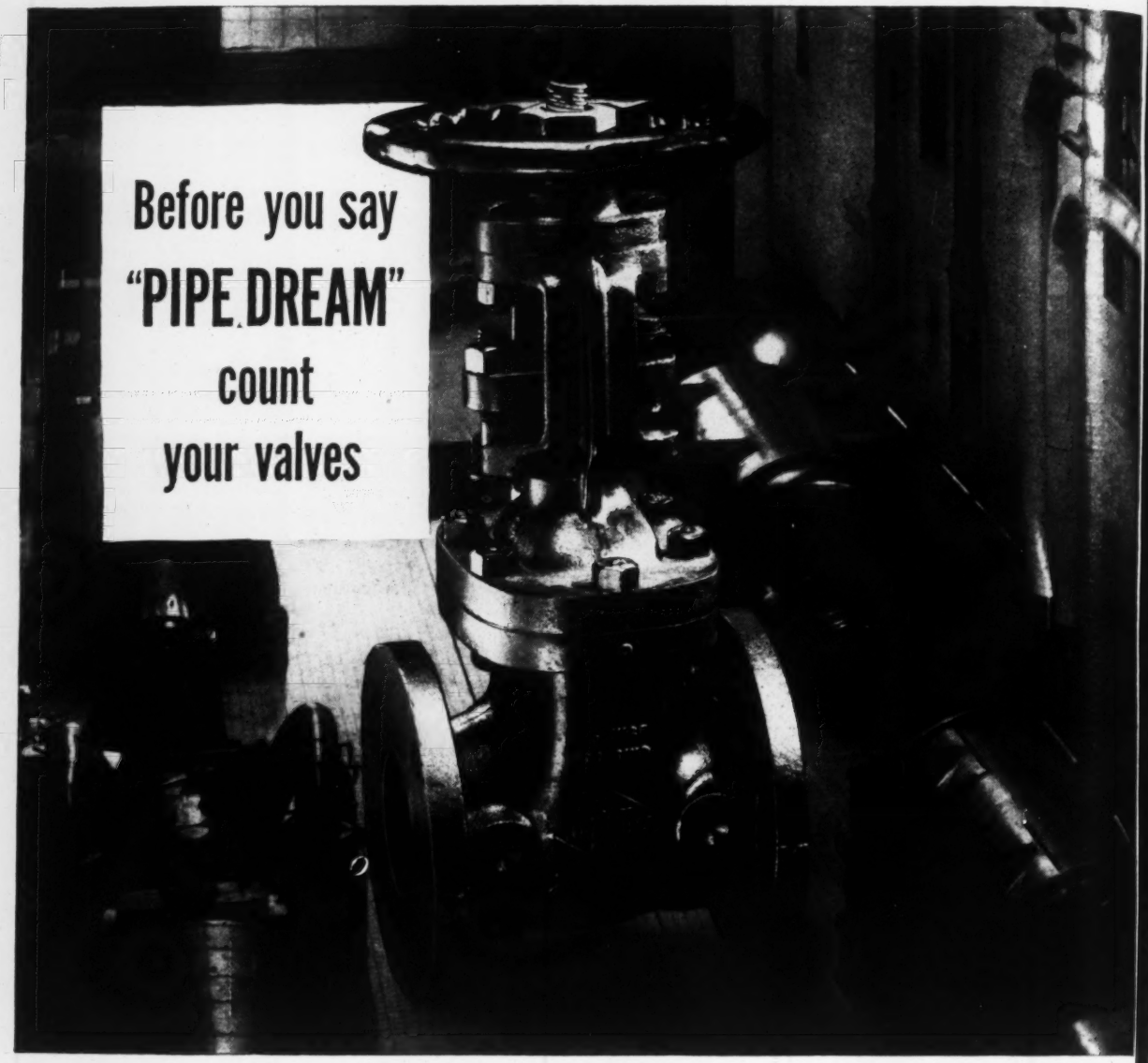

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Delta-Mendota Intake Canal and Tracy Pumping Plant, Central Valley, Calif.

Continued from preceding page

32 Screened-gravel bed. for riprap	850 cy	7.00	5.50	6.60
33 Screened-gravel blanket	730 cy	6.00	4.75	5.30
34 Gravel surfacing	3,000 cy	5.00	4.00	6.60
35 Furn. treated-timber piles, up to 45 ft. in length	23,000 lf	0.90	1.00	1.21
36 Furn. untreated-timber piles, up to 45 ft. in length	87,100 lf	0.40	0.50	0.53
37 Furn. untreated-timber piles, 50 ft. to 65 ft. in length	18,000 lf	0.46	0.55	0.63
38 Furnishing steel H piles	86,500 lf	2.10	1.90	2.37
39 Driving vertical treated-timber & untreated-timber piles	105,000 lf	1.20	0.55	0.62
40 Driving batter untr.-timber piles	10,000 lf	1.20	0.65	0.79
41 Driving vertical steel H piles	67,000 lf	1.10	0.85	1.03
42 Driving batter steel H piles	12,000 lf	1.10	1.00	1.20
43 Furnishing and handling cement	70,000 bbl	4.00	2.80	3.00
44 Furn. reinf. bars, 1 in. dia. and larger	1,225,000 lb	0.06	0.045	0.066
45 Furn.reinf. bars, ¾ in. dia. to 1 in. dia. incl.	677,000 lb	0.06	0.046	0.066
46 Furn. reinf. bars, ½ in. dia. and smaller	82,000 lb	0.07	0.048	0.07
47 Placing reinf. bars, 1 in. dia. and larger	3,615,000 lb	0.035	0.03	0.05
48 Placing reinf. bars, ¾ in. dia to ¾ in. dia., incl	2,530,000 lb	0.035	0.035	0.05
49 Placing reinf. bars, ½ in. dia. and smaller	465,000 lb	0.04	0.04	0.05
50 Conc. in paving & cover slabs	900 cy	30.00	19.50	30.00
51 Conc. in railroad & highway culvert & in inlet-transition struct.	4,000 cy	40.00	42.00	40.00
52 First-stage concrete in pumping-plant substructure	17,000 cy	32.00	26.00	25.00
53 First-stage concrete in pumping-plant superstructure	9,000 cy	50.00	50.00	50.00
54 Second-stage concrete in pumping-plant structure	6,300 cy	25.00	14.00	20.00
55 Concrete in blockouts	150 cy	60.00	60.00	130.00
56 Concrete in discharge-pipe struct.	15,000 cy	20.00	22.00	21.00
57 Painting reinforcement bars	25,000 lf	0.10	0.30	0.26
58 Constructing control joints	5,700 lf	1.00	3.30	5.25
59 Furnishing and placing corkboard joint filler	20,000 sf	0.40	0.60	0.66
60 Furnishing and placing ½ in dehydrated-cork joint filler	550 sf	1.00	2.70	0.66
61 Furnishing and placing 1 in. dehydrated-cork joint filler	270 sf	2.00	3.30	1.30
62 Furn. and placing met. seals	6,000 lf	3.00	2.25	2.60
63 Placing rubber water stops	80 lf	2.00	2.70	2.60
64 Constructing asphalt seals	750 lf	0.30	8.00	1.30
65 Insulating reinf. bars & electrical metal conduit, intersection	4,500 ea	0.30	0.35	0.66
66 Finishing lighting recesses	35 ea	15.00	8.00	33.00
67 Furn. and placing membrane waterproofing	22,000 sf	0.20	0.50	0.40
68 Furn. and applying mastic w. p.	2,000 sy	1.70	3.00	1.45
69 Furnishing and applying dampproofing	100 sy	1.20	2.70	0.66
70 Painting interior surfaces of pump discharge pipes and surge tanks	480,000 sf	0.20	0.35	0.40
71 Painting exposed ext. surf. of pump discharge pipes & surge tanks	325,000 sf	0.20	0.20	0.18
72 Installing butterfly valves	450,000 lb	0.05	0.04	0.046
73 Install. bulkhead gate guides and latches	68,000 lb	0.04	0.12	0.046
74 Installing bulkhead gates	84,000 lb	0.04	0.07	0.046
75 Installing cranes	505,000 lb	0.04	0.07	0.046
76 Install. crane-runway, trashrake-gantry, and transfer-car track rails in concrete	97,000 lb	0.04	0.08	0.13
77 Installing crane rail on timber ties	70 lf	15.00	7.00	13.00
78 Installing trashracks	190,000 lb	0.04	0.08	0.26
79 Installing miscellaneous equip.	35,500 lb	0.10	0.30	0.26
80 Install. met. tubing, & brass, steel, w. i. & c. i. pipe, fittings, & valves, less than 6 in. nominal dia	50,000 lb	0.30	0.50	0.40
81 Install. metal tubing, & brass, steel, w. i. & c. i. pipe, fittings, and valves, 6 in. & greater nominal dia	139,000 lb	0.25	0.16	0.42
82 Installing metal inserts	1,000 lb	0.25	0.70	1.30
83 Installing metal railings	48,000 lb	0.12	0.40	0.42
84 Installing draft-tube pier noses	50,000 lb	0.05	0.15	0.20
85 Installing embedded metal frames for openings in floors, walls, and decks	6,000 lb	0.15	0.40	0.40
86 Installing oil storage tanks	7,000 lb	0.25	0.20	0.20
87 Installing metal accordian doors	3,700 sf	0.60	2.00	4.00
88 Installing metal swinging doors	1,200 sf	0.60	2.00	4.00
89 Installing metal fire door	40 sf	1.00	2.70	4.00
90 Furn. & install. met.-sash windows	1,600 sf	4.00	2.70	2.00
91 Installing metal louvers	1,600 lb	0.20	1.00	0.66
92 Installing metal toilet partitions	700 sf	0.60	1.00	0.66
93 Install. misc. metalwork	10,000 lb	0.15	0.50	0.40
94 Install. plumbing fixtures & appur. hardware	5,000 lb	0.25	0.40	0.24
95 Furn. and install. embedded electrical metal conduit, 1¼ in. or less in diameter	16,000 lf	1.00	1.35	1.00
96 Furn. and install. embedded met. cond., larger than 1¼ in. and not larger than 3 in. in dia	9,200 lf	2.00	2.00	3.00
97 Furn. & install. embedded electrical nonmet. cond	200 lf	1.00	2.50	1.00
98 Furn. and install. grounding material	6,500 lb	2.00	1.50	1.00
99 Furnishing and constructing guard-rails	3,300 lf	4.00	2.50	4.00
80 Transp. mat. of all kinds for the Gov. or its agents, other than the contr., bet. railhead and pumping-plant site	2,200 tons	10.00	8.00	6.60
Schedule No. 2				
81 Excavation for structures	142,000 cy	0.40	0.35	0.40
82 Backfill	81,000 cy	0.20	0.40	0.26
83 Compacting backfill for structures	1,800 cy	5.00	4.00	4.00
84 Trimming foundations for conc. in lateral lining	300 sy	1.50	4.00	1.30
85 Furnishing and handling cement	28,000 bbl	4.00	2.80	3.00
86 Furn. reinf. bars, 1 in. dia. and larger	800,000 lb	0.06	0.045	0.066
87 Furn. reinf. bars, ¾ in. dia. to 1 in. dia., inclusive	467,000 lb	0.06	0.046	0.066
88 Furn. reinf. bars, ½ in. dia. and smaller	20,000 lb	0.07	0.048	0.07
89 Placing reinf. bars, 1 in. dia. and larger	2,985,000 lb	0.03	0.03	0.05
90 Placing reinf. bars, ¾ in. dia. to 1 in. dia. incl	1,556,000 lb	0.03	0.035	0.05
91 Placing reinf. bars, ½ in. dia. and smaller	60,000 lb	0.04	0.04	0.05
92 Concrete in paving slabs	100 cy	30.00	22.50	30.00
93 Concr. in discharge cond. and outlet struct	18,300 cy	30.00	29.50	30.50
94 Concrete in lateral lining	25 cy	60.00	60.00	46.00
95 Furnishing and placing ½ in. dehydrated-cork joint filler	340 sf	2.00	2.50	1.30
96 Furn., plac. met. water stops	22,000 lb	0.25	0.50	1.30
97 Furnishing and placing roofing	475 sf	0.20	1.00	0.66
98 Installing siphon-breaker valves	7,000 lb	0.10	0.20	0.26
99 Installing metal swinging doors	20 sf	1.00	4.00	5.30
100 Install. misc. metalwork	500 lb	0.20	0.75	1.30
101 Furn. & install. embedded electric metal cond. 1¼ in. or less in dia	100 lf	1.00	1.50	1.00
102 Furn., install. embedded electr. met. cond. larger than 1¼" & not larger than 3" in dia	100 lf	5.00	2.50	3.00
103 Furn., install. grounding mat	50 lb	2.00	2.00	1.00

Dredging at Two Harbors, Minnesota

OWNER: War Department, Duluth District, Corps of Engineers, Duluth, Minnesota.

PROJECT: Construction of a new east breakwater, removal of the existing east breakwater, enlargement of harbor basin by dredging, and other incidental work at Two Harbors, Minnesota. The new breakwater will be 1630 ft. long when completed, its cribs 30 ft. wide. 325 ft. of shore connection will be rubble mound construction and the remaining 1305 ft. timber crib breakwater on rubble foundation.

CONDITIONS: Contractor is to furnish all plant, labor, materials, and equipment except materials furnished by U. S. Plants available for use by contractor are dredging plant, floating plant, and plant including necessary cranes, compressors, etc. for miscellaneous operations and constructin crib. Stipulated contract time is 720 days. The tentativ completion date is October 9, 1950. Access to job site is available by rail, highway, and water. Minimum wage rates per hr. range from $0.675 to $1.50 for carpenters, $0.925 to $1.75 for power equipment operators, and $1.25 to $1.87 for marine construction labor. Unskilled labor wage rate is $1.00 per hr.

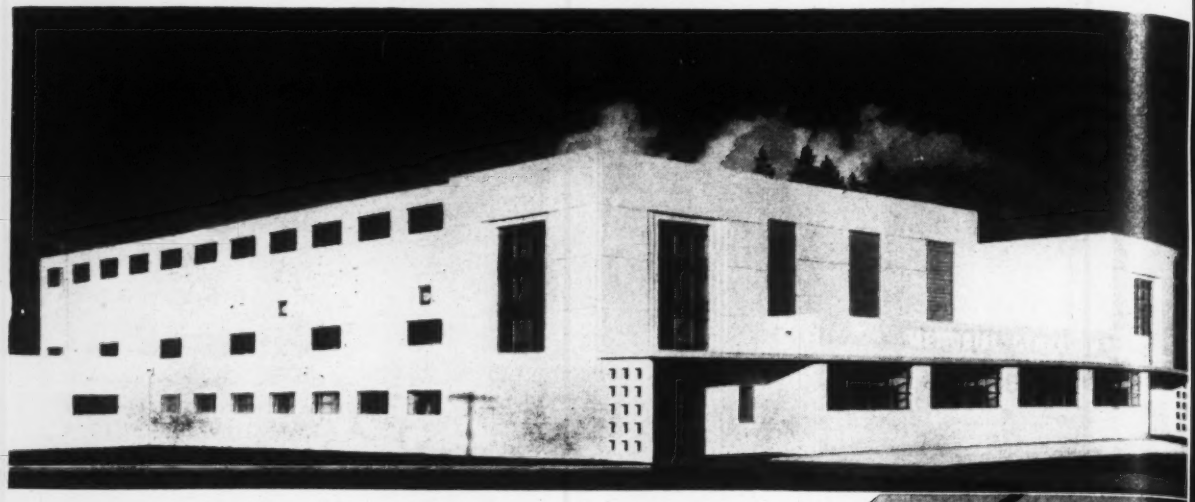
BIDS: Three bids were received, ranging from the contract low of $2,478.422 to $2.679,560. Contract was awarded June 11, 1947.

LIST OF BIDDERS:

1. Zenith Dredge Co., Duluth, Minn. (contract) $2,478,422
2. Great Lakes Dredge & Dock Co., Chicago, Ill. 2,547,542
3. Merritt-Chapman & Scott Corp., Cleveland, O. 2,679,560

Item	Quantity	Government Estimate	Unit Prices (1)	Unit Prices (2)
1 Removal of existing east breakwater	lump sum	$134,300.00	$40,000.00	$101,140.00
2 Breakwater stone	400,000 ton	4.04	4.50	5.10
3 Framing and placing timber				

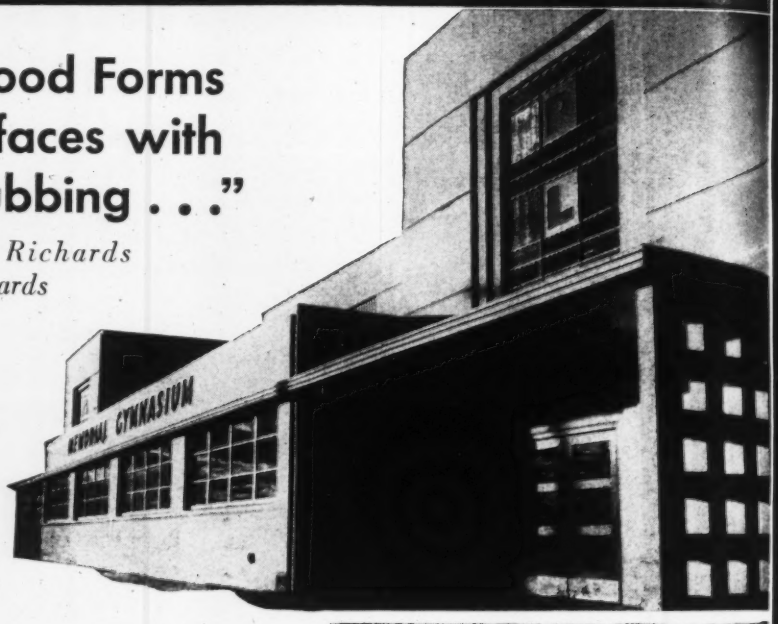
Continued on next page



'Douglas Fir Plywood Forms Give Smooth Surfaces with a Minimum of Rubbing . . ."

Says Architect John Richards of Lea, Pearson and Richards

AGAIN plywood has been effectively used to produce an attractive architectural concrete treatment — in this new memorial gymnasium for Pacific Lutheran College at Parkland, Washington. Architects were Lea, Pearson and Richards of Tacoma. John Richards has this to say: "When the contractor, Dolph Jones of Tacoma, suggested 5/8-inch plywood forms to produce a smooth finish in place of the ordinary forms and stucco finish originally specified — and at no additional cost — we quickly accepted. The extreme minimum of rubbing and finishing accounted for much of the economy in construction."



Top photos show the completed exterior of the gymnasium. Lower: last of plywood panels going into place for the second pour.

PLYWOOD FORMS OFFER THESE ADVANTAGES

- Plywood forms may be re-used again and again; they're more economical.
- Plywood produces smooth surfaces, reducing finishing time and cost.
- Panels are strong, rigid — yet light and easy to handle.
- Plywood's large panel size covers quickly, economically.
- Plywood forms are puncture-proof, water and mortar tight.
- Plywood offers superior nail-holding qualities.
- Plywood is easy to work by hand or with power tools.

Plywood's Many Advantages Keep Demands Greater Than Present Supply

Douglas fir plywood production is greater than prewar. Demand, however, is unprecedented, and plywood may not always be readily available. For price and delivery information see your regular source of supply. Technical data may be secured from the Douglas Fir Plywood Association, Tacoma 2, Wash.

LARGE, LIGHT, STRONG

Douglas Fir PLYWOOD

Real Wood **Panels**

Dredging at Two Harbors, Minnesota

Continued from preceding page

cribs	2,818 Mf bm	78.56	98.00	64.00
4 Steel; bolts; washers and miscellaneous	139,300 lb	.14	.11	.10
5 Steel; drift bolts; and spikes	258,100 lb	.112	.10	.10
6 Steel; ice guard plates	162,100 lb	.123	.155	.10
7 Dredging, common	105,000 cy	.62	1.20	.60
8 Dredging, rock	17,000 cy	8.48	10.00	6.30

Flood Protection, Williamsport, Pa.

OWNER: U. S. Engineers, Baltimore, Md.; E. H. Luetze, resident engineer.

PROJECT: Williamsport Flood Protection Project-Unit 3, Pumping Stations located along left bank of West Branch of Susquehanna River in the City of Williamsport, Lycoming County, Pa. Work includes: construction of reinforced concrete and brick pumping stations at Hepburn, Basin, and Penn Streets; furnishing and installing automatic flood gates, sluice gates, and flap valves; furnishing and installing motor-driven pumping units; construction of power and lighting system and transformer substation for each pumping station; and gravel surfacing of pumping station terraces and access road.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by both rail and highway. Stipulated contract time is 730 days from date of notice to proceed. Stipulated minimum labor wage rates per hour are: carpenters, $1.50; cement finishers, $1.75; electricians, $1.75; structural iron workers, $2.25; bulldozer operators, $1.75; tractor operators, $1.75; truck drivers, dump and flat top, $1.00; and laborers, $0.90.

BIDS: Three bids were received, ranging from the contract low of $1,087,613.00 to $1,296,263.00. Contract was awarded February 5, 1948.

LIST OF BIDDERS:

1. Lycoming Const. Co., Inc., Williamsport, Pa. (contract) $1,087,613.00
2. The Tuller Const. Co., Red Bank, N. J. $1,124,997.00
3. Merritt-Chapman & Scott Corp., New York, N. Y. 1,296,263.00

Item	Quantity	Unit Prices (1)	(2)	(3)
1 Clearing of sites and diversion and care of water	lump sum	$125,000.00	.....	.....
2 Removal of concrete & masonry structure	200 cy	7.00	$16.00	$10.00
3 Excavation—common	9,700 cy	2.10	3.00	1.25
4 Excavation—borrow	200 cy	4.00	1.25	2.15
5 Sheeting and shoring				
a. Type A	4,160 sf	3.10	3.50	4.20
b. Type B	400 sf	3.00	1.50	2.75
6 Backfill—compacted	6,100 cy	1.25	1.40	2.40
7 Derrick stone	70 cy	20.00	20.00	18.00
8 Steel sheet piling	600 sf	4.50	2.00	4.20
9 Concrete				
a. Reinforced	3,680 cy	54.00	45.00	67.00
b. Gravity	70 cy	49.00	25.00	62.00
10 Portland cement	4,665 bbl	5.20	5.00	5.00
11 Steel reinforcement	536,000 lb	.115	.10	.14
12 Rubber water stops				
a. Type A	380 lf	3.00	2.50	4.25
b. Type B	380 lf	2.00	1.20	3.00
14 Cast iron	1,300 lb	.30	.20	.70
15 Cast iron pipe	17,000 lb	.21	.11	.20
16 Steel pipe—30" diameter	2,700 lb	1.00	.35	1.15
17 Cylindrical steel lining	20,000 lb	.65	.50	.43
18 Trash racks & catwalk				
a. Steel trash racks	23,000 lb	.35	.28	.55
b. Catwalk	8,200 lb	.40	33	.30
19 Miscellaneous metal	22,000 lb	.50	.40	.60
20 Automatic timber flood gates	3 ea	4,850.00	4,000.00	1,850.00
21 Sluice gates				
a. 36" by 36"	1 ea	4,500.00	3,500.00	3,500.00
b. 60" by 60"	8 ea	6,650.00	6,000.00	6,100.00
c. 72" by 72"	1 ea	8,000.00	7,000.00	7,500.00
d. 108" by 108"	2 ea	17,000.00	16,000.00	17,600.00
e. 48" diameter	1 ea	5,400.00	5,000.00	5,100.00
f. 78" diameter	1 ea	12,000.00	11,000.00	12,000.00
22 Flap valves				
a. 4" diameter	3 ea	80.00	40.00	90.00
b. 10" diameter	1 ea	150.00	180.00	165.00
c. 14" diameter	1 ea	280.00	240.00	250.00
d. 42" diameter	2 ea	1,450.00	1,450.00	1,250.00
e. 66" diameter	4 ea	4,500.00	4,000.00	4,100.00
23 Motor operated gate valve—30"	1 ea	3,350.00	2,800.00	2,750.00
24 Pipe handrailing	2,100 lb	55	30	60
25 Gravel surfacing	165 cy	6.00	5.00	28.00
26 Pressure grouting—sewer lining	200 cf	11.00	3.00	8.00
27 Pumping station superstructures				
a. Hepburn Street (Unglazed tile backed walls)	lump sum	50,000.00	.....	.....
b. Basin Street (face brick backed walls)	lump sum	6,000.00	.....	.....
c. Penn Street (face brick backed walls)	lump sum	22,000.00	.....	.....
28 Traveling cranes				
a. 5-ton	1 ea	3,000.00	2,600.00	2,100.00
b. 15-ton	1 ea	4,000.00	4,800.00	2,850.00
29 Float gages				
a. Hepburn Street	3 ea	270.00	200.00	350.00
b. Basin Street	1 ea	270.00	200.00	300.00
c. Penn Street	1 ea	270.00	200.00	310.00
30 Propeller pumps				
a. 44,000 g.p.m.	2 ea	16,500.00	25,000.00	26,000.00
b. 112,200 g.p.m.	4 ea	43,650.00	57,500.00	61,000.00
31 Centrifugal pumps				
a. 100 g.p.m.	1 ea	1,200.00	1,500.00	2,000.00
b. 250 g.p.m.	2 ea	1,400.00	1,800.00	2,500.00
c. 2,500 g.p.m.	1 ea	5,200.00	5,500.00	8,700.00
d. 5,000 g.p.m.	1 ea	12,419.00	9,000.00	13,200.00
32. Power and lighting systems				
a. Hepburn Street	lump sum	4,930.00	.....	.....
b. Basin Street	lump sum	5,200.00	.....	.....
c. Penn Street	lump sum	5,800.00	.....	.....
33 Electrical switchgears				
a. Hepburn Street	lump sum	24,000.00	.....	.....
b. Penn Street	lump sum	12,800.00	.....	.....
34 Transformer substations				
a. Hepburn Street	lump sum	28,700.00	.....	.....
b. Penn Street	lump sum	21,900.00	.....	.....
35 Substation enclosures				
a. Hepburn Street	lump sum	700.00	.....	.....
b. Penn Street	lump sum	850.00	.....	.....
36 Bituminous railroad crossing	200 sy	10.00	3.00	12.00

Housing Construction at Fort Worth Army Airfield, Texas

OWNER: U. S. Engineers, War Department, Galveston, Texas.

PROJECT: Construction in connection with the building of 2 unit apartments of stucco and plaster at the Fort Worth Army Airfield, Fort Worth, Texas.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is by rail and highway. The stipulated contract time is 200 days. Skilled labor wage rate is $1.75 per hr., semi-skilled, $1.00, and common, $.80. Electricians receive $1.875 per hr.; bricklayers, $2.25; painters, $1.75; and plasterers, $2.00.

BIDS: Seven bids were received, ranging from the contract low of $752,702.04 to $873,195.13. The contract was awarded June 20, 1947.

LIST OF BIDDERS:

1. McCann Const. Co., Inc., Fort Worth, Tex. (contract) $752,702.04
2. United Const. Co., Dallas, Tex $789,905.10
3. J. W. Bateson Co., Inc., Dallas Tex $791,344.90
4. Oscar Quisle, Fort Worth, Tex $800,577.99
5. Shaw and Estes, Dallas, Tex $807,083.20
6. T. C. Bateson Const. Co., Dallas, Tex $856,861.79
7. J. O. Boyd Const. Co., Dallas, Tex $873,195.13

Item	Quantity	Government Estimate	Unit Prices (1)	(2)
1 2-Unit Apt. bldg; type X	45 ea	$16,945.00	$14,788.00	$15,830.00
3 Pipe, water; existing, remove, 8" dia	1,440 lf	305	.88	.56
4 Pipe, water; existing, relay, 8" dia.	1,440 lf	88	1.42	1.46
5 Pipe, water; cast iron 8" dia. (New)	1,750 lf	2.96	3.46	4.45
6 Pipe, water; cast iron, 6" dia	1,490 lf	2.34	2.73	3.73
7 Pipe, water; steel, galv., 1½" dia.	1,370 lf	.75	.55	1.07
8 Pipe, water; steel, galv., 1¼" dia.	2,970 lf	.64	.49	1.02
9 Hydrants, fire; 6-inch	13 ea	284.85	141.12	120.00
10 Pipe, sewer; V. C., 8" dia	4,340 lf	1.20	3.68	1.51
11 Pipe, sewer; V. C., 6" dia	4,860 lf	.97	1.10	.93
12 Manholes; sewer, 6' deep or less	5 ea	159.50	142.24	86.50
13 Manholes; sewer, 6' to 9' deep	5 ea	224.50	208.32	148.00
14 Manholes; sewer, over 9' deep	2 ea	392.50	208.32	187.00

Continued on next page

Housing Construction at Fort Worth Army Airfield, Texas

Continued from preceding page

15 Cleanouts; sewer, 8-inch	4 ea	52.00	21.84	16.00
16 Cleanouts; sewer, 6 inch	57 ea	22.40	13.22	14.20
17 Pipe, gas; 2½" dia	2,900 lf	1.13	.88	1.33
18 Pipe, gas 2" dia	1,140 lf	1.08	.77	1.18
19 Pipe, gas; 1¼" dia	2,450 lf	.77	.55	1.12
20 Pipe, gas; 1" dia	3,050 lf	.625	.43	.98
21 Pipe, culvert; metal arch (18" x 11")	190 lf	3.50	3.84	3.06
22 Curb; concrete	400 lf	1.80	1.23	1.38
23 Curb and gutter; concrete	4,480 lf	1.53	1.29	1.38
24 Sidewalks; concrete	22,030 sf	.33	.308	.265
25 Platforms, concrete; refuse container	745 sf	.72	.37	.46
26 Gravel; flexible base	2,135 cy	6.85	4.93	5.43
27 Asphalt; bituminous prime coat	3,715 gal	.215	.44	.205
28 Asphalt; single surf. treat	2,785 gal	.23	.44	.185
29 Aggregate; single surf. treat	95 cy	10.90	8.96	6.80
30 Elect. dist. sys	lump sum	11,163.00	11,000.00	10,500.00

Viaduct Substructure, Chicago, Ill.

OWNER: Department of Public Works, Chicago, Ill., W. W. DeBerard, city engineer.

PROJECT: Construction of a viaduct substructure, 214 ft. long, on N. State St. from Kinzie St. to Chicago River. Viaduct has reinforced concrete deck and measures 66 ft. in width. Work includes installation of barricades and signs, removal of rock, boulders, masonry and other obstructions and the construction of sub piers.

CONDITIONS: Two lines of cassons or wells adjacent to a subway tube and a shaft and tunnel of the Illinois Bell Telephone Co. require particular consideration to prevent damage. All materials are to be furnished by contractor. Access to job site is available by rail, highway, and water. Stipulated contract time is six months after date of notification. The common labor wage rate is $1.50 per hr.

BIDS: Four bids were received, ranging from the contract low of $188,650.00 to $333,150.00. Contract was awarded November 13, 1947.

LIST OF BIDDERS:

1. Thomas McQueen Co., Forest Park, Ill. (contract) — $188,650.00
2. M. J. Boyle & Co., Chicago, Ill. — 217,012.50
3. Kenny Const. Co., Chicago, Ill. — 218,055.00
4. Great Lakes Dredge & Dock Co., Chicago, Ill. — 333,150.00

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Barricades and signs	lump sum	$500.00	$500.00	$200.00
2	Removal of obstructions	lump sum	1,500.00	500.00	1,000.00
3	Removal of rock, boulders, masonry	425 cy	6.00	2.50	44.00
4	Standard portland cement	2,700 bbls	3.50	4.50	3.55
5	Sub piers (excl. of cement & steel)	38,000 cf	3.05	3.85	3.68
6	Borings beneath sub piers	100 lf	15.00	5.00	3.00
7	Struct. carbon steel for sub piers	lump sum	3,000.00	600.00	1,500.00
8	Reinf. metal for sub piers	180,000 lb	0.09	0.08	0.10
9	Abutment complete	lump sum	32,000.00	36,750.00	24,000.00
10	Sand filling	100 cy	3.50	4.30	3.25
11	Yellow pine or douglas fir—untreated	6,000 bf	300.00	150.00	240.00
12	Pre-heat—extra mix. of concrete	200 cy	1.50	1.00	1.10
13	Cover & heat concrete in place	200 cy	2.00	1.00	1.60
14	High-early-strength portland cement	250 bbl	4.00	5.00	4.10
15	Mechanics' time per hour	200 hr	6.00	4.00	4.50
16	Laborers' time per hour	200 hr	5.00	2.50	3.50

Aqueduct Tunnel, Boston, Mass.

OWNER: Commonwealth of Massachusetts; Construction Division, Metropolitan District Commission, engineers.

PROJECT: Construction of a tunnel in the cities of Newton and Boston and in the towns of Weston and Brookline, Massachusetts. The work consists of excavating about 4.7 miles of tunnel 12 ft. finished inside diameter, of lining with concrete the tunnels excavated under this and other contracts, of constructing shaft about 240 ft. deep in Brookline and other work incidental to the completion of the shafts and tunnel.

CONDITIONS: All materials are to be furnished by contractor. Access to job site is available by highway. Stipulated contract time is 900 calendar days. Minimum wage rates specified per hr. are: miners, $1.625; bulldozer operators, $1.80; power shovel operators, $2.175; hoisting engineers, $1.80; electricians, $2.15; painters, $1.875; cement finishers, $1.995; common laborers, in tunnel, $1.50; and above ground, $1.40.

BIDS: Four bids were received, ranging from the contract low of $9,529,866.94 to $14,738,677.50. Contract was awarded October 23, 1947.

LIST OF BIDDERS:

1. P. Perini & Sons, Inc., Framingham, Mass. C. J. Maney Co., Inc., Somerville, Mass. Walsh Const. Co., Inc., & Rugo Const. Co., Inc., Boston, Mass. (contract) — $9,529,866.94
2. V. Barletta Co., Roslindale, Mass. & The Savin Const. Corp., East Hartford, Conn — 10,966,357.08
3. Tunnel Const. Corp. — 12,449,228.75
4. S. A. Healy Co., Marinucci Bros. & Co., Boston, Mass. & The Peter F. Connolly Co., Osterville, Mass. — 14,738,677.50

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Earth excavation in open cut	20,000 cy	$2.00	$2.85	$6.00
2	Rock excavation in open cut	3,000 cy	5.00	5.30	10.00
3	Rock excavation in enlarging top of shaft 7	6,000 cy	5.00	5.20	10.00
4	Rock excavation in shaft 7A	2,750 cy	30.00	24.75	35.00
5	Excavation in tunnel	200,000 cy	17.00	24.75	24.45
6	Enlargement of shafts and tunnel	300 cy	22.50	24.75	20.00
7	Clearing	6 ac	600.00	600.00	500.00
8	Pumping from shafts and tunnel	275,000 Mf gal	15	.20	.10
9	Drainage chan. for shafts, tunnel	31,000 lf	27.00	12.00	40.00
10	Forms for shaft 6	205 lf	160.00	142.00	70.00
11	Forms for shafts 5, 7 and 7A	550 lf	450.00	325.00	200.00
12	Forms for tunnel lining	29,100 lf	25.00	20.00	20.00
13	Concrete in shaft 5 below elev. 30	3,750 cy	25.00	40.00	50.00
14	Concrete in shaft 6	750 cy	35.00	20.00	40.00
15	Concrete in shaft 7 below elev. 115 and 7A below elev. 103	4,000 cy	25.00	18.00	40.00
16	Concrete in tunnel lining	90,000 cy	12.40	21.00	20.00
17	Cyclopean concrete	1,500 cy	30.00	14.00	20.00
18	Concr. in bldg. at top of shaft 5	1,300 cy	60.00	30.00	51.00
19	Concrete in valve chambers at tops of shafts 7 and 7A	900 cy	50.00	35.00	40.00
20	Concrete not included in items 13 to 19 inclusive	400 cy	77.00	50.00	50.00
21	Excess concr. (fixed price, $5.00)	1,000 cy	5.00	5.00	5.00
22	Structural steel support	150,000 lb	.20	.20	.15
23	Timbering in shafts and tunnel	350 Mbm	240.00	150.00	200.00
24	Miscellaneous timber and lumber	50 Mbm	325.00	200.00	250.00
25	Dry packing	2,000 cy	8.00	12.00	15.00
26	Drilling holes in rock or masonry	3,000 lf	1.00	2.00	1.50
27	Steel pipe for grouting	8,000 lf	1.25	.50	1.50
28	Connections for grouting	4,000 ea	3.00	2.00	7.50
29	Sand for grout and protective coating	1,000 cy	5.50	3.00	5.00
30	Mixing and placing grout	8,000 cy	16.50	15.00	15.00
31	Protect. coating of cmt. mortar	100 cy	35.00	50.00	40.00
32	Portland cement	210,000 bbl	3.75	3.50	3.50
33	Reinforcing steel	950,000 lb	.10	.10	0.12
34	Miscel. refilling and embanking	15,000 cy	.70	.75	1.50
35	Consolidated refill	4,000 cy	2.00	1.25	2.00
36	Mortar linings, 2" or less	14,000 sf	4.00	2.50	2.50
37	Removal and storage of soil	15,000 cy	1.00	1.00	1.00
38	Cast-iron pipe and fittings	300,000 lb	.25	.15	.25
39	Steel plate pipe and linings	1,000,000 lb	.35	.35	.30
40	Miscel. c. i., w. i. and steel	80,000 lb	.60	.70	.70
41	Galvanizing	60,000 lb	.07	.10	.05
42	Miscellaneous non-ferrous metals	8,000 lb	1.75	2.00	1.00
43	Caring for and setting metal work	700,000 lb	.07	.10	.10
44	Paving	50 cy	15.00	20.00	40.00
45	Stone masonry	200 cy	255.00	100.00	200.00
46	Crushed stone, gravel and sand	750 cy	5.00	3.50	8.00
47	Temporary fencing	5,000 lf	2.50	2.00	2.50
48	Permanent fencing	500 lf	3.00	2.50	3.00
49	Drain pipe, not exceeding 12"	300 lf	2.00	3.00	3.00
50	Drain pipe, over 12" and not exceeding 24"	50 lf	3.50	4.00	7.00
51	Brick masonry	150 cy	200.00	75.00	100.00
52	Medical and hospital services	30 mo	1,000.00	2,000.00	3,000.00
53	Sanitary services	30 mo	2,500.00	2,000.00	2,500.00
54	Hypochlorite of lime	1,000 lb	1.00	.10	.10
55	Locker houses at shafts 5 and 7A	lump sum	15,000.00	26,000.00	20,000.00
56	Maint. and serv. locker houses	120 house mo	125.00	300.00	200.00
57	Reinforced-concrete pressure pipe	2,500 lf	60.00	80.00	80.00
58	Steel castings	170,000 lb	.65	.50	.50
59	Surface dressing of top soil	16,000 cy	1.50	1.00	2.00
60	Seeding and grassing	20 ac	750.00	200.00	1,000.00
61	Construction of shaft 5, in addition to other items	lump sum	75,000.00	60,000.00	200,000.00
62	Construction of shafts 6, 7, 7A, in addition to other items	lump sum	10,000.00	20,000.00	100,000.00
63	Clean. and restor. of grounds	lump sum	10,000.00	20,000.00	75,000.00
64	Furnishing performance bond, rate per $1,000		7.50	8.00	15.00

Southern Pacific Cascade Line Railroad Relocation, Lane County, Oregon

OWNER: U. S. Engineers, Portland, Oregon; Col. O. E. Walsh, engineer.

PROJECT: Constructing the Lost Creek Section of the Southern Pacific Cascade Line Railroad relocation, including clearing and grubbing, and stripping. Constructing embankment from borrow, drainage structures, a timber bridge, a change in the Lost Creek channel and a highway underpass. Placing protection stone in the channel approach and outfall sections of the multiple arch concrete culvert and relocating a portion of the existing Lost Creek county road. The site of the work is located approximately 0.6 of a mile south of the village of Dexter, Lane County, Oregon, in the vicinity of Lookout Point Dam Reservoir (Meridian Site).

CONDITIONS: Access to job site is available by both rail and highway. Stipulated contract time is 365 days after notice to proceed. Prevailing skilled labor wage rate ranges from $1.85 to $2.25 per hr.; semi-skilled labor rate is $1.75 per hr.; and common, $1.50 per hr.

BIDS: Five bids were received, ranging from the contract low of $1,748,777.50 to $2,775,055.00. Contract was awarded Oct. 27, 1947.

LIST OF BIDDERS:

1. McNutt Bros., Eugene, Ore. (contract) $1,748,777.50
2. Dorena Const. Co., Cottage Grove, Ore. 1,971,883.00
3. Macco Corp., Clearwater, Calif. 2,390,540.00
4. Morrison-Knudsen Co., Portland, Ore. 2,536,318.00
5. Leonard & Slate & C. Hall, Portland, Ore. 2,775,055.00

	Item	Quantity	Unit Prices: Engineer's Estimate	(1)	(2)
1	Clearing and grubbing	25 ac	$513.00	$1,500.00	$1,175.00
2	Excavation, unclassified, from government borrow areas	1,520,000 cy	.95	.68	.867
2a	Excavation, unclassified, from contractor borrow areas (alternate)	1,900,000 cy	.68	.....	.674
3	Excavation from stockpiles	35,000 cy	.50	.60	.44
4	Stripping	51,700 cy	.38	.60	.44
5	Foundation excavation	3,500 cy	3.75	7.00	2.75
6	Concrete	9,400 cy	33.50	28.25	32.00
7	Cement	14,100 bbl	4.00	4.20	4.00
8	Reinforcing steel	1,436,000 lb	.102	.0975	.09
9	Damp-proofing	450 sq	6.50	12.50	9.00
10	Dumped riprap	11,600 cy	1.92	4.00	2.00
11	Filter material	5,800 cy	3.45	5.00	2.75
12	Dry rock pavement	10 cy	9.50	30.00	14.00
13	Corrugated metal culvert pipe, in place—36"	160 lf	11.90	15.50	12.00
14	Corrugated metal culvert pipe, in place—18"	180 lf	9.45	6.75	5.00
15	Perforated track drain, in place—12"	50 lf	7.50	4.00	3.50
16	Perforated track drain, in place—8"	50 lf	4.90	2.75	3.00
17	Abutment drain, in place—4"	20 lf	2.70	1.50	2.50
18	Pipe railing, in place	700 lb	.26	1.00	.80
20	Sprinkling	2,000 M gal	3.30	2.00	2.00
21	Additional rolling	1,000 roll hr	7.12	8.00	9.00
22	Right-of-way fence, barbed wire	1,260 rod	2.74	5.00	5.00
23	Right-of-way fence, barbed and woven wire	1,200 rod	4.00	6.50	6.50
24	Gravel surface for roads	7,450 cy	2.10	3.00	2.00
25	Cartage	2,650.8 ton	5.20	1.25	1.50
26	Corrugated metal culvert pipe, in place—48"	80 lf	25.00	23.00	17.00

Dupont Circle Underpass, Washington, D. C.

OWNER: District of Columbia Highway Department; H. C. Whitehurst, director.

PROJECT: Construction of the Dupont Circle Underpass on Connecticut Avenue, between R and N Streets, N.W., Washington, D. C. Work comprises two separate and adjacent underpasses, one consisting of a streetcar underpass, and the other, of a combined vehicular traffic underpass and depressed roadway. The elevation of the low points of the tunnels will be approximately 20 ft. below the present grade. To bypass the active construction stages, vehicular traffic will be maintained by a series of belt detours.

CONDITIONS: All materials are to be furnished by the contractor. Minimum wage rates specified per hr. are: bricklayers, $2.375; carpenters, $2.15; cement finishers, $1.97; electricians, $2.25; structural iron workers, $2.40; drivers of dump trucks, up to and including 8 wheels, $1.00; drivers of trucks over 8 wheels, $1.25; and laborers, $1.20.

BIDS: Four bids were received, ranging from the contract low of $3,951,485.00 to $4,437,986.00. Contract was awarded November 28, 1947.

LIST OF BIDDERS:

1. John McShain, Inc., Bethesda, Md. (contract) $3,951,485.00
2. Poirer & McLane Corp., Washington, D. C 4,184,030.00
3. Chas. H. Tompkins Co., Washington, D. C 4,288,775.00
4. The Tuller Const. Co., Red Bank, N. J. 4,437,986.00

	Item	Quantity	Unit Prices: (1)	(2)	(3)
1	Ordinary excavation, except in grading, including all backfill and disposal	123,000 cy	$7.37	$9.50	$9.00
2	Rock excavation, including disposal	500 cy	73.80	20.00	20.00
3	Grading (between completed walls)	22,000 cy	2.50	9.50	2.00
4	Concrete, Class BB, in place	24,500 cy	40.50	40.00	45.00
5	Concrete, Class BB, in waterproofing protection, in place	120,000 sf	0.425	0.40	0.50
6	Concrete, Class X, light weight, for fill, in place	2,250 cy	32.70	25.00	25.00
7	Reinforcing steel, in place	2,080,000 lb	0.0673	0.12	0.09
8	Structural steel, in place	3,400,000 lb	0.105	0.10	0.13
9	Wrought iron, in place	36,450 lb	1.62	1.20	1.50
10	Sawn granite, 4" thick, in place	40,900 sf	6.50	6.00	7.50
11	Cut granite, in place	10,500 cf	19.00	20.00	20.00
12	Terra cotta tile, 4" in waterproofing protection, in place	131,000 sf	0.47	0.50	0.70
13	Ceramic tile facing, in place	45,200 sf	1.85	2.00	1.60
14	Membrane waterproofing, 3 ply in place	30,000 sy	2.45	2.50	2.00
15	Dampproofing, in place	1,250 sy	1.50	1.00	1.00
16	Structural railing, in place	3,200 lf	17.00	20.00	15.00
17	Wrought iron railing at stairwells, in place	490 lf	11.00	15.00	10.00
18	Wrought iron railing in stairways in place	1,660 lf	4.00	6.00	3.50
19	Lamp posts, in railing and on center wall, as shown on the plan in place	47 ea	250.00	220.00	2.50
20	Lamp posts, at stairwells, as shown on the plans in place	16 ea	150.00	130.00	170.00
21	Perforated clay drain pipe, in place—8"	6,000 lf	9.25	5.00	3.00
22	Cast iron drain pipe, in place—6"	500 lf	15.50	8.00	8.00
23	Cast iron drain pipe, in place—8"	370 lf	26.00	10.00	14.00
24	Cast iron drain pipe, in place—12"	2,800 lf	45.20	25.00	40.00
25	Cast iron drain pipe, in place—16"	3,200 lf	48.00	20.00	15.00
26	Cast iron drain pipe, in place—18"	100 lf	86.00	50.00	130.00
27	Sewer brick masonry, in manholes, in place	65 cy	85.00	100.00	150.00
28	Manhole frames and coves, in place	28 ea	40.00	50.00	60.00
29	Cast iron inlet frames and gratings for catch basins in transit tube, in place	6 ea	200.00	50.00	100.00
30	Cast iron inlet frames and gratings for catch basins in vehicular underpass, in place	12 ea	150.00	120.00	350.00
31	Light fixtures in transit tubes, in place	238 ea	14.00	10.00	20.00
32	Light fixtures in transit stations, in place	110 ea	90.00	100.00	100.00
33	Vehicular tunnel lighting fixtures, in place	163 ea	100.00	100.00	110.00
34	Conduit, exposed, in transit tubes, in place	6,900 lf	1.00	1.00	1.50
35	Conduit, concealed, in transit station, in place	6,300 lf	1.00	1.20	1.50
36	Conduit, in vehicular underpass, in place	7,850 lf	0.70	0.80	1.00
37	Pilot light boxes, in place	2 ea	160.00	100.00	100.00
38	Ventilating fans, in place	8 ea	1,100.00	1,000.00	1,250.00
39	Ventilating grills, in place	8 ea	150.00	100.00	125.00
40	Ventilating hoods, in place	8 ea	800.00	300.00	1,000.00
41	Carbon monoxide analysers, complete in place	4 ea	2,500.00	2,500.00	2,500.00
42	Furnishing and installing air sampling system in Dupont Circle vehicular underpass, complete in place	lump sum	3,100.00	2,000.00	3,000.00
43	Electrical installation for ventilating and lighting Dupont Circle vehicular underpass, complete in place	lump sum	7,100.00	6,000.00	10,000.00
44	Electrical installation for lighting of transit tubes and stations, complete in place	lump sum	7,200.00	6,000.00	10,000.00
45	Miscellaneous metal, complete in place	lump sum	12,000.00	10,000.00	10,000.00
46	Furnishing and installing water system for the Dupont Circle vehicular underpass, complete in place	lump sum	2,300.00	1,000.00	2,000.00
47	Furnishing and installing water system for the transit tubes and stations, complete in place	lump sum	700.00	500.00	1,000.00
48	Plumbing system in transit station lavoratory, complete in place	lump sum	5,500.00	3,000.00	10,000.00
49	Removal, storage and replacement of the fountain in Dupont Circle	lump sum	23,000.00	10,000.00	32,000.00
50	Furnishing temporary support of utilities during constr. of the project	lump sum	6,500.00	1,000.00	25,000.00

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(Number refers to item directly below it)

340

SELF-PROPELLED DRILL — Self-propelled McCarthy rock boring machine according to the manufacturer handles 4- to 12-in. augers for horizontal drilling up to 150 ft. in earth or rock formations. Individually operated jacks permit adjustment to the required drilling angle. Powered by a 25- or 32-hp. air-cooled motor, hydraulic drive cylinder has 35-in. stroke, to give carriage an 8-ft. travel on the 12-ft. by 24½-in. heavy channel welded frame. Also available in truck-mounted and trench types.—*Salem Tool Co., Salem, Ohio.*

341

CHANNEL FRAME CONVEYOR —The new "Marco" standardized channel frame conveyor will make for better bulk materials handling. Basic units can be interchanged on varied installations. Terminals and intermediate sections are prefabricated and factory-assembled. "Standardization assures proper alignment, easy erection, and dependable operation on the job. The manufacturer offers a complete line of conveyor assemblies which may be used in full or in part for the construction of complete conveyors, or as replacement on existing units.—*E. F. Marsh Engineering Co., 4324 West Clayton Ave., St. Louis, Mo.*

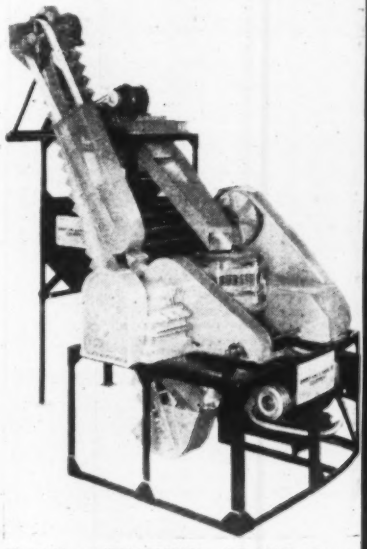
342

RIBBED-TOP CONVEYOR BELT — A new ribbed top conveyor belt said to prevent backslip in carrying sand and gravel, wet-mixed concrete, and other materials up steep inclines has been perfected. It features chevron-shaped ribs a quarter inch higher than the belt surface. The ribs serve as barriers, trapping the water and preventing the backwash of materials down the belt on incline operations.—*Goodyear Tire & Rubber Co., Akron, Ohio.*

343

WATER - RESISTANT ADHESIVE— (Armstrong F-1402) for installing metal and plastic wall tile over plaster, plywood, wallboard, concrete and other bases has low shrinkage factor which help prevent face of metal and plastic tile from becoming concave. Advantages claimed: (1) Water resistant; (2) will not bleed through joints or permit tiles to loosen after installation; (3) bond strength increases with higher temperatures; (4) will not bleed to adjacent surfaces or be absorbed into plaster or composition wall; (5) will adhere to thoroughly hardened oil painted surfaces; (6) light-weight, weighing 12 lb. per gallon. One gallon will cover 50 sq. ft. of wall surface. Available in 5-, 3½- and 1-gal. cans.—*Armstrong Cork Co., Lancaster, Pa.*

344



ROCK CRUSHING PLANT—Picture is a model of 500-ton-per-day rock crushing plant. It includes a roller bearing jaw crusher as a primary breaker, an elevator, a double deck pulsator over a steel bin so arranged that the over-size is returned to a gyrosphere secondary crusher. The model plant shown is one sixth the size of the outfit.—*Smith Engineering Works, Milwaukee, Wis.*

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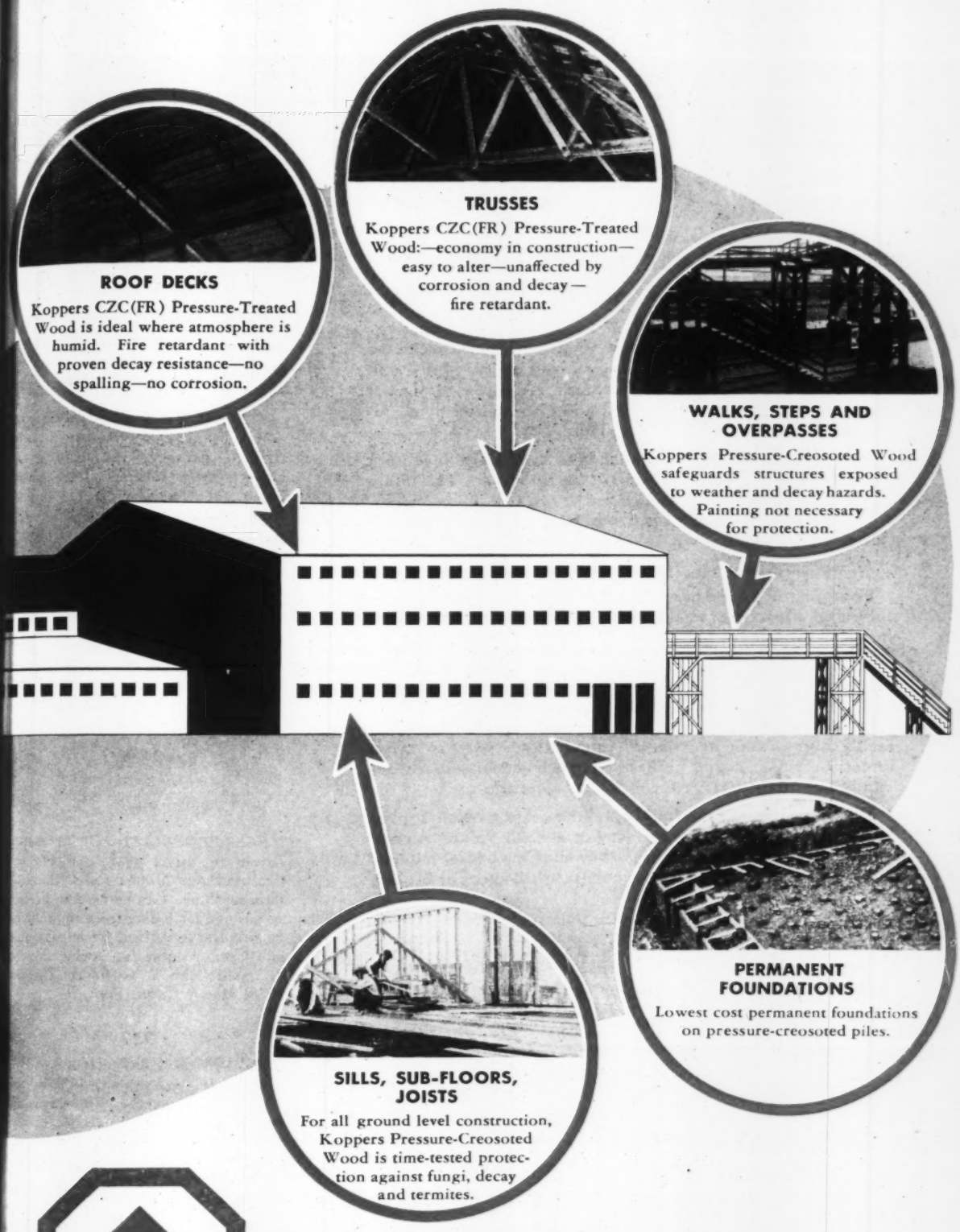

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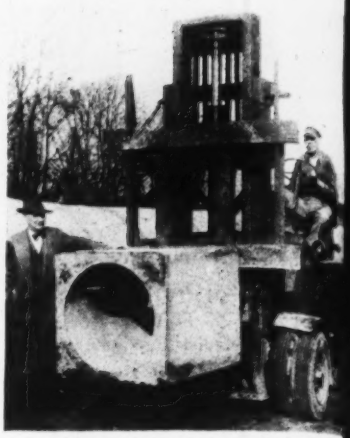
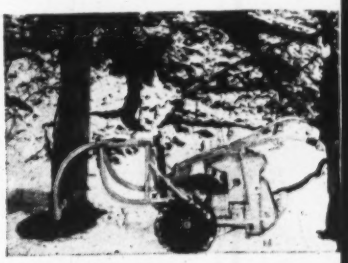


SPECIAL TYPE CONCRETE PIPE —When a customer needed a special type of concrete pipe this maker created a new form that makes a square exterior but has the customary round interior. Illustrated is a piece of the 36-in. type pipe on a lift. It was part of a large order.—*Universal Concrete Pipe Co., Rochester, N. Y.*

351



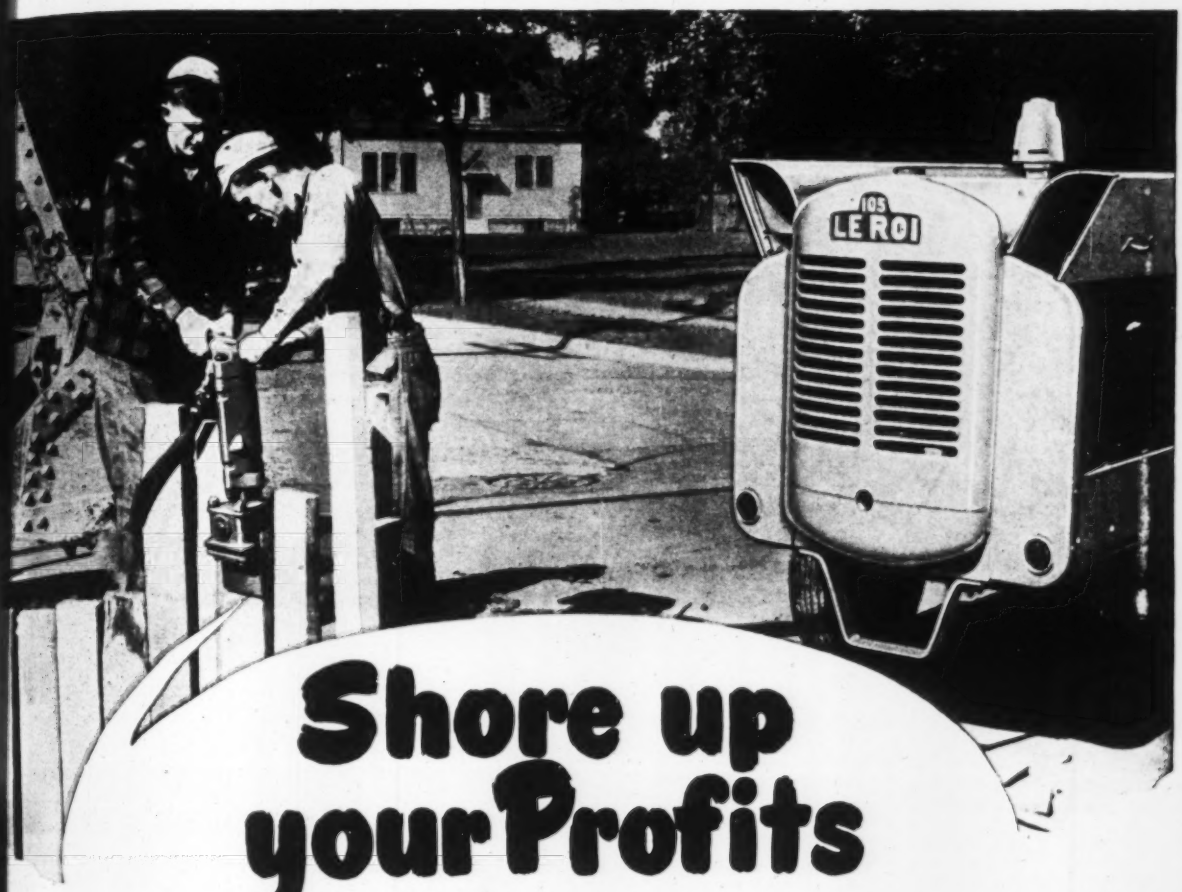
SELF-PROPELLED POWER SAW — Driven by direct gear, tool fits on Graham-Paige Motors Corp. Rototiller farm machine. Can be used in horizontal position for felling trees and then can be switched to vertical for cutting them into logs. A table for sawing firewood or lumber also is provided.—*Graham-Paige Motors Corp., York, Pa.*

352

ALUMINUM YARDSTICK — Folds in one simple operation to 18¾ in. total length. No corrosion or tarnishing. Spring hinge assures accurate alignment when opened to full length. Figures on Klick lightweight yardstick are dye stamped for permanency.—*C. S. Thompson Co., Wichita, Kan.*

353

OXYACETYLENE WELDING TORCH—New Airco 800 weighs 1½ lb. and is only 11½ in. long. Suitable for any welding job from thinnest sheet metal up to 1½ in. in thickness, offering wide operating range. Better flame con-



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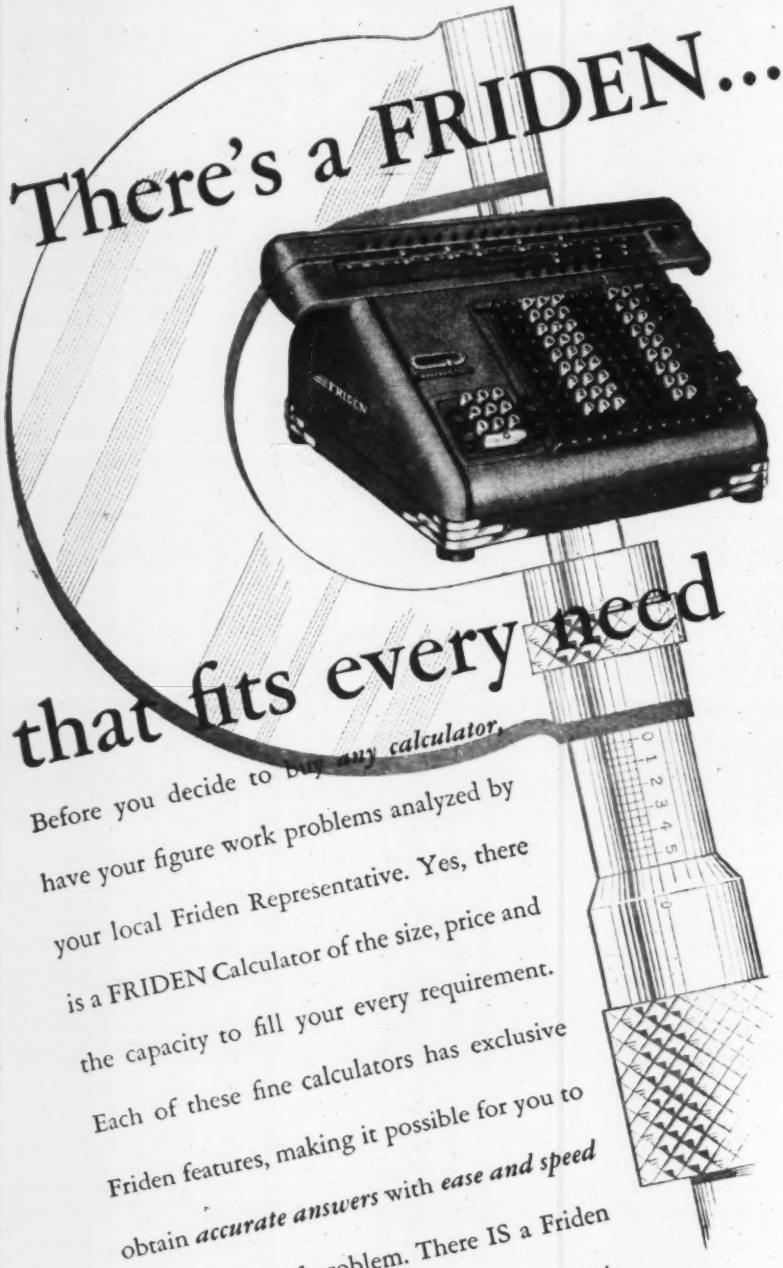

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354

HIGH SPEED RADIAL SAW—Designed for cutting wood, plastics and some composition materials. Powered by compact lightweight motor available in 1 or 2 hp. ratings. Motor operates with spindle speed of 8,000 rpm. Equipped with 12-in. saw blade cutting a full 4 in. Model RS saw can be set at any angle desired for all needed cuts. Saw has 27-in. long stroke. Table measures 17x46 in. and is 31 in. from the floor. Shipping weight, including 2 hp. motor, is 260 lb.—*Porter-Cable Machine Co., 1714 N. Salina St., Syracuse 8, N. Y.*

355

GREASE FITTING—Kleenseal bull-neck type grease fittings can be securely contacted to all commercial hydraulic couplers. Flush ball check keeps dirt out and grease in. Enlarged neck size and protecting locking tab protect against damage and wear. Spring will not compress to restrict flow of heaviest lubricants. Large internal diameter permits greater flow of lubricant and requires less pressure to clear fitting.—*Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis 20, Mo.*

356

LIGHTWEIGHT ROAD GRADER—Model 30 power maintaner is hydraulically controlled from operator's seat and features attachment which includes

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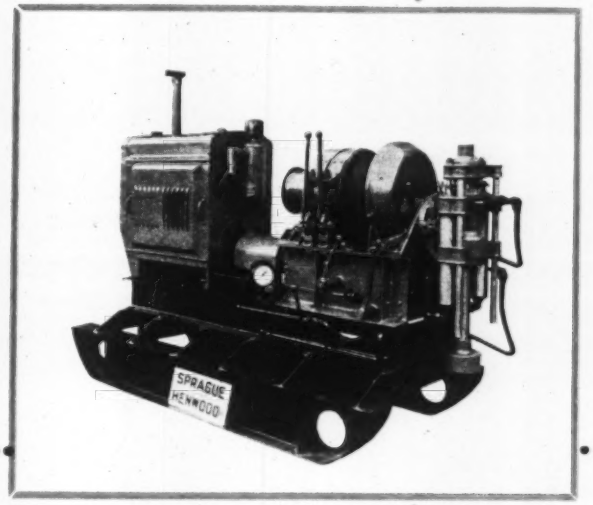

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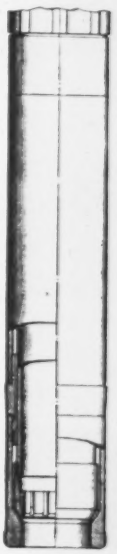

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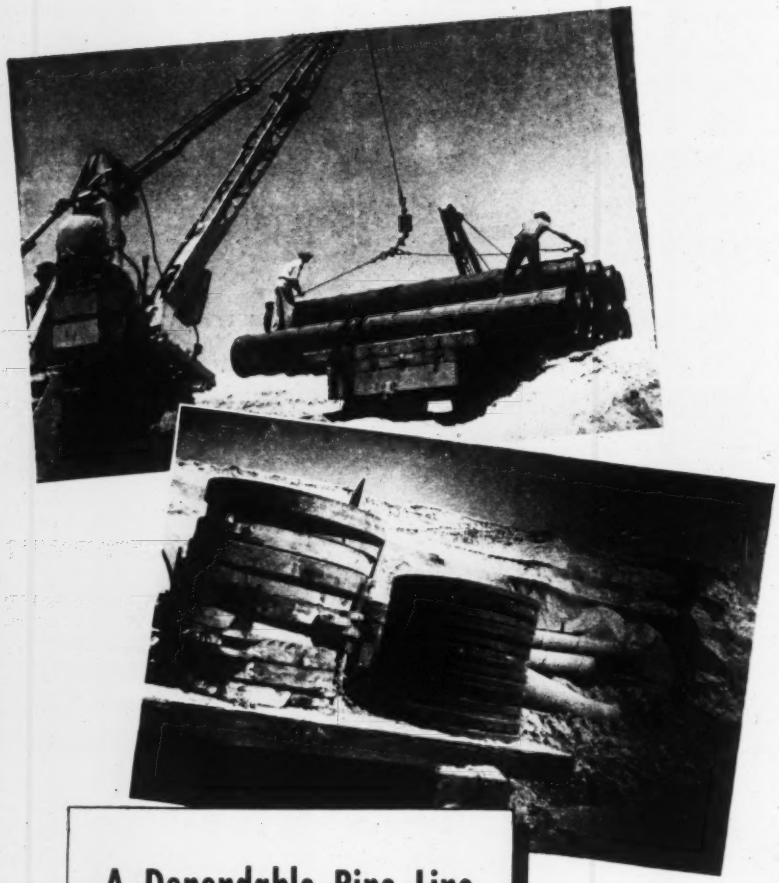

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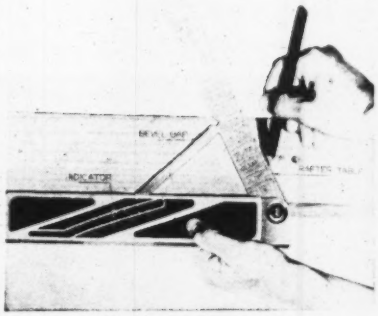
357



FRAMING SQUARE — New automatic framing square permits carpenters to solve roof framing problems accurately. The device combines framing square with simple tables. Operator need only to know width of building and pitch of roof to get length required as well as pattern for marking cuts. Tool has jackknife blade with rafter tables incorporated on either side to determine length of rafters. Blade is raised until indicator is opposite rise per foot and an accurate pattern for both plumb cuts and mitre cuts is provided.—*Lloyd I. Crowley, 1880 S. 12th St., Salem, Ore.*

358

CONCRETE CUTTER—The manufacturer has designed this machine to provide features assuring long life for its diamond wheel. It cuts pavement of all types for trenches, removes core samples, cuts curbs and ramps, and performs similar jobs. Equipped with a Fairbanks Morse Onan 2-cylinder, 10 hp. gasoline engine, it has abundant reserve power for the spindle. On account of this power the speed of the wheel is not greatly influenced by sudden changes in depth of cut or other causes of increased load. The ball bearing-mounted spindle is double ended, permitting either right or left hand use.

ANNOUNCING!

THE NEW 7-TON TOURNACRANE

MODEL EC-7

FOR TOUGH LIFT-AND-CARRY JOBS

Here's the new EC-7 Tournacrane! A mobile 7-ton crane that can carry and spot any load it can pick up... And it can pick up and carry a heavier load over tougher working terrain than any other mobile crane of similar rated capacity. It does this lifting without the use of mobility-robbing outriggers! And off-road travel with capacity loads is a cinch with the Tournacrane's large, low-pressure tires and special torque-proportioning differential that supplies up to 4 times greater power to wheel on the firmest footing!

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Tournacrane's telescopic boom permits work where headroom is as low as 8′9″ or as high up as 31′... And this boom assures superior load control at all times, since only short-length hoist cable is required in any working position. Complete rotation of the Tournacrane is easy with the Tournapull turning at right angles to the crane, which pivots on its axis—this means full revolving action with a work radius up to 31′. It also means the unit can work efficiently in extremely congested areas, because it can be turned completely around in less than 20′.

All of these features make the EC-7 a more efficient utility crane—and it is only one of a complete line of Tournacranes now available, including the 15-ton, 30-ton, and others of heavier capacities. These are lift-and-carry tools that can mean more profits for you!

TOURNALAYER DIVISION

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Use fast-working electrical tools on any construction or maintenance job with this high capacity, portable, compact electric plant. Equipped with four-receptacle box for direct plug-in of tools or lights. Available with carrying frame, or dolly-mounted. Powered by Onan 10 HP, two-cylinder, 4-cycle, air-cooled engine. Shipped complete . . . ready to go!

NEW ONAN "CK" ELECTRIC PLANTS are available in 5000 watts D.C., 115 and 230 volts; 2000 and 3000 watts A.C. in all standard voltages. COMPLETE ELECTRIC PLANT LINE INCLUDES: A.C.—350 to 35,000 watts in all standard voltages and frequencies. D.C.—600 to 15,000 watts, 115 and 230 volts. Battery Chargers—500 to 6,000 watts, 6, 12, 24, 32 and 115 volts. ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 HP. BH: 2-cylinder opposed, 5½ HP. 1B: 1-cylinder, 3¼ HP.

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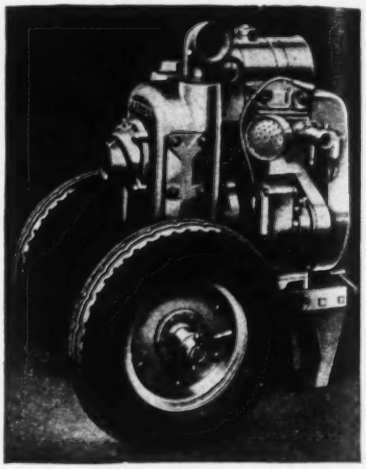
Water from a large tank floods the wheel when in cutting position.—*Felker Mfg. Co., Torrance, Calif.*

359



PORTABLE HIGH PRESSURE PUMP—At 10 ft. suction lift, 2-in. portable pressure pump weighing only 150 lb. including pneumatic tires and mounting frame, has range of volumes and pressures from 135 g.p.m. at 10 lb. discharge pressure to 30 g.p.m. at 60 lb. discharge pressure and a maximum shutoff pressure of 70 lb. Powered by 5-hp. Wisconsin air-cooled gasoline engine. Open-bladed or trash-type impeller combines high pumping efficiency with ability to handle large solids. Impeller discharges upward from bottom of shell, violently agitating sediment and forcing it out with flow of water. Maker stresses exclusive "sure-prime" feature.—*Jaeger Machine Co., Columbus 16, Ohio.*

360

RECORD-SIZE PLASTIC SHEETS. (100x120 in.) more than twice area of any other such units, are now available in limited quantities for partitions, wall facings, facades and curved glazing.—*Rohm & Haas Co., Knoxville, Tenn.*

361

PORTABLE LIGHT GENERATOR—A small, portable air powered electric generator has been developed for use on inaccessible jobs and in the case of power failures. Capable of operating two 75-watt bulbs, the generator is powered by compressed air, and the manufacturer says it cannot be harmed by short circuits or overload and is usable after submerging in water. The 8¾ lb. machine, known as the "Airlite," uses 10 cu.ft. of air per minute at 90-lb. pressure, and has an output of 150 watts or 115 volts.—*Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.*

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New Plant at Palatka, Fla.

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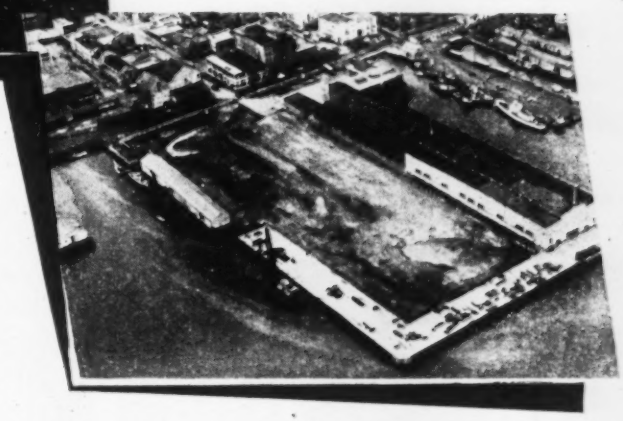
New Bedford, Mass.



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VERTICAL DRILL—McCarthy vertical drill, mounted on 1½-ton truck, or larger, handles earth-drilling augers up to 20 in. Powered by a 32-hp. air-cooled motor, drill rods and boom are hydraulically controlled. Two individually operated jacks eliminate strain from the truck springs, when drilling, and during transit the derrick is lowered over the power unit.—*Salem Tool Co., Salem, Ohio.*

363

HYDRAULIC SCRAPER — Two-wheel Speedhaul units are designed for use with fast rubber-tired tractors and have heaped bowl capacities of 3.2 and 5.4 cu.yd. Cut, lift, dump and spread operations are fully hydraulic. Forced "roll-out" ejection dumps load quickly and cleans bowl. Powered apron rises independently of bowl to insure maximum loads. Wheels on tapered roller bearings are cantilever-mounted.—*Be-Ge Manufacturing Co., Gilroy, Calif.*

364

PAINT FOR CONCRETE SURFACES—For protecting concrete surfaces, synthetic paint dries to durable glossy finish in three to four hours and seals concrete surfaces from moisture. Paint contains no drying oils and dries by evaporation, not by oxidation. Is resistant to abrasion and has high water repellant properties, making it use-

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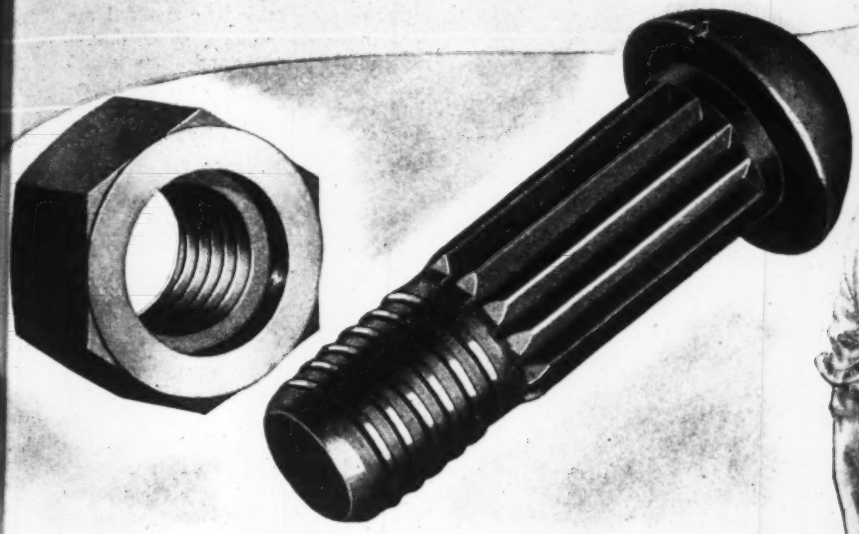

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The heavy splines on the bolt shank grip the steel and prevent turning while the Dardelet locking principle (see illustration) guarantees a sure-lock of the nut to the bolt.

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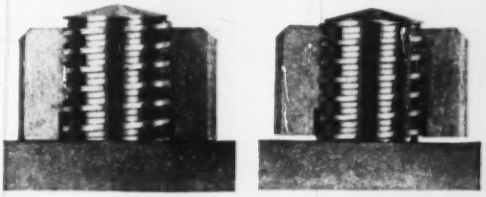
THE DARDELET LOCKING PRINCIPLE



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ful for covering basement floors or walls or ground floors of industrial plants. One gallon covers from 300 to 600 sq. ft. on the first coat and 700 sq. ft. on second coat.—*Lowebco, Inc., 1525 E. 53d St., Chicago 15, Ill.*

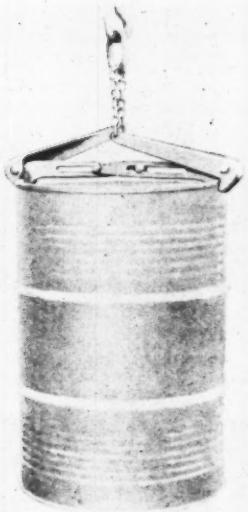
365

OPEN GEAR LUBRICANT—Advantages claimed are: Stays put under extreme heat conditions. Does not solidify or become brittle at temperatures below zero. Maintains body and lubricating qualities under conditions of extreme heat. Pennsylvania crude oils, rather than asphaltic base material, are used in compounding product that is made in both summer and winter grades for all types of open gears on heavy-duty equipment. Has melting point above 300 deg. F.—*D-A Lubricant Co., Inc., Indianapolis, Ind.*

366

RIVET STUD—For attaching corrugated metal roofing to steel purlins rivet studs are flux-filled in the base and end-welded in position on purlin with a Nelson stud welding gun. Operator works from top side of roof only, requiring no rigging or scaffolding below. After Rivweld is welded, corrugated sheet is set in place over studs and stud extension is driven through sheets by rubber hammer. Stud extension is then upset and rounded off by machinist's hammer and ordinary rivet set.—*Nelson Sales Corp., Toledo Ave. and East 28th St., Lorain, Ohio.*

367



DRUM CHIME TONGS—To solve the problem of moving, loading and stacking drums, lightweight drum chime tongs are now being made for heavy duty service. They can handle all drums

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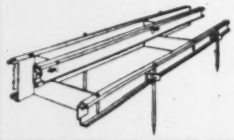
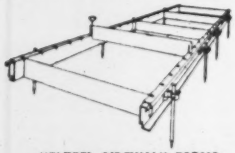


COMBINED CURB AND GUTTER FORMS

Each 10' section consists of 1 back curb form, 1 front gutter form and 1 face curb form, also 2 face curb form supports, 2 round stakes for back form and 2 round stakes for gutter form.



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10' sections, slotted every 12" for division plates, which are removed without disturbing side forms after concrete takes its initial set.

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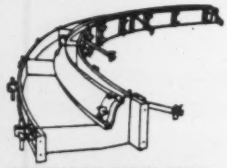

HELTZEL RIGID RADIUS FORMS

For building concrete curbs or curb and gutters when all intersections or corners must match. Heltzel forms made in sets to form a specified radius.

HELTZEL FLEXIBLE FORMS

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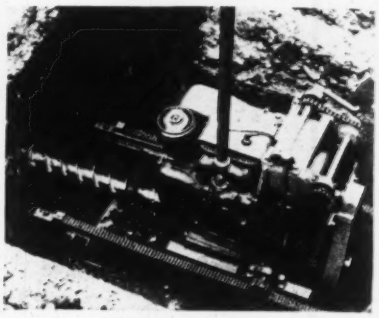
safely, with or without heads, from 18 to 24 in. dia. Drums may be moved into and out of storage and stacked in tiers to any height—*Downs Crane and Hoist Co., Los Angeles, Calif.*

368



UNDER PAVEMENT DRILLER—This new utility drill for drilling under pavements replaces, with a number of improvements, the flexible shaft drill, out of production during the war. It is equipped with a 12-hp. Wisconsin motor and will drill a 4¼-in. hole to a distance of 50 ft. or more. Accessories include the Parmanco direction-control lead point and Parmanco augers with interrupted flights and secondary cutters which insure a straight clean hole.—*Paris Mfg. Co., Paris, Ill.*

369

ALL METAL SLIDE RULE—Precision instrument to meet need for enduring accuracy under all conditions of handling. For all-metal construction of rule with magnesium alloy body, advantages claimed include: non-warping, precision manufacture to 0.001 in. tolerance; grooves and spring channels keep cursor centered and away from scale surface; precision made adjusting screws for the easy and accurate line-up of scales; optical groove centers slider and affords easy, accurate setting; slider does not stick, bind or wobble. Surface and entire rule unaffected by constant cleaning.—*Picket & Eckel, Inc., 1111 So. Fremont Ave., Alhambra, Calif.*

370

NEW CHAIN SAW FEATURES—Two new features in engine and tail stock assemblies of Disston Chain Saw include automatic chain lubricator and a simplified "cradle balanced" tail stock. Chain lubricator on engine is designed to make volume of oil to chain entirely automatic and of sufficient pressure to prevent clogging of line by sawdust and other foreign matter. Pump operates in any position and flow is automatically shut off when chain is not running. Tail stock has been completely redesigned and made smaller without sacrificing strength.

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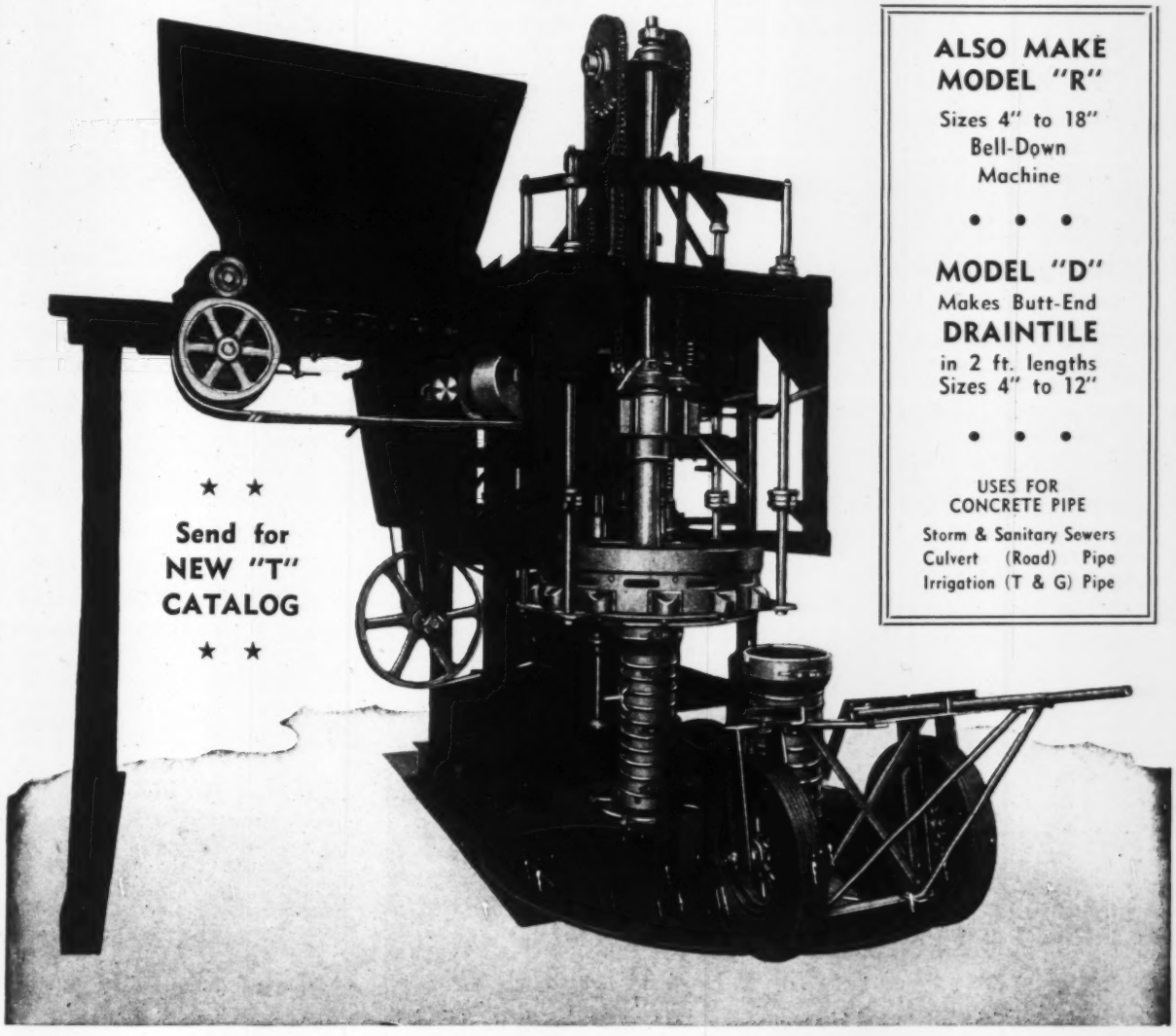

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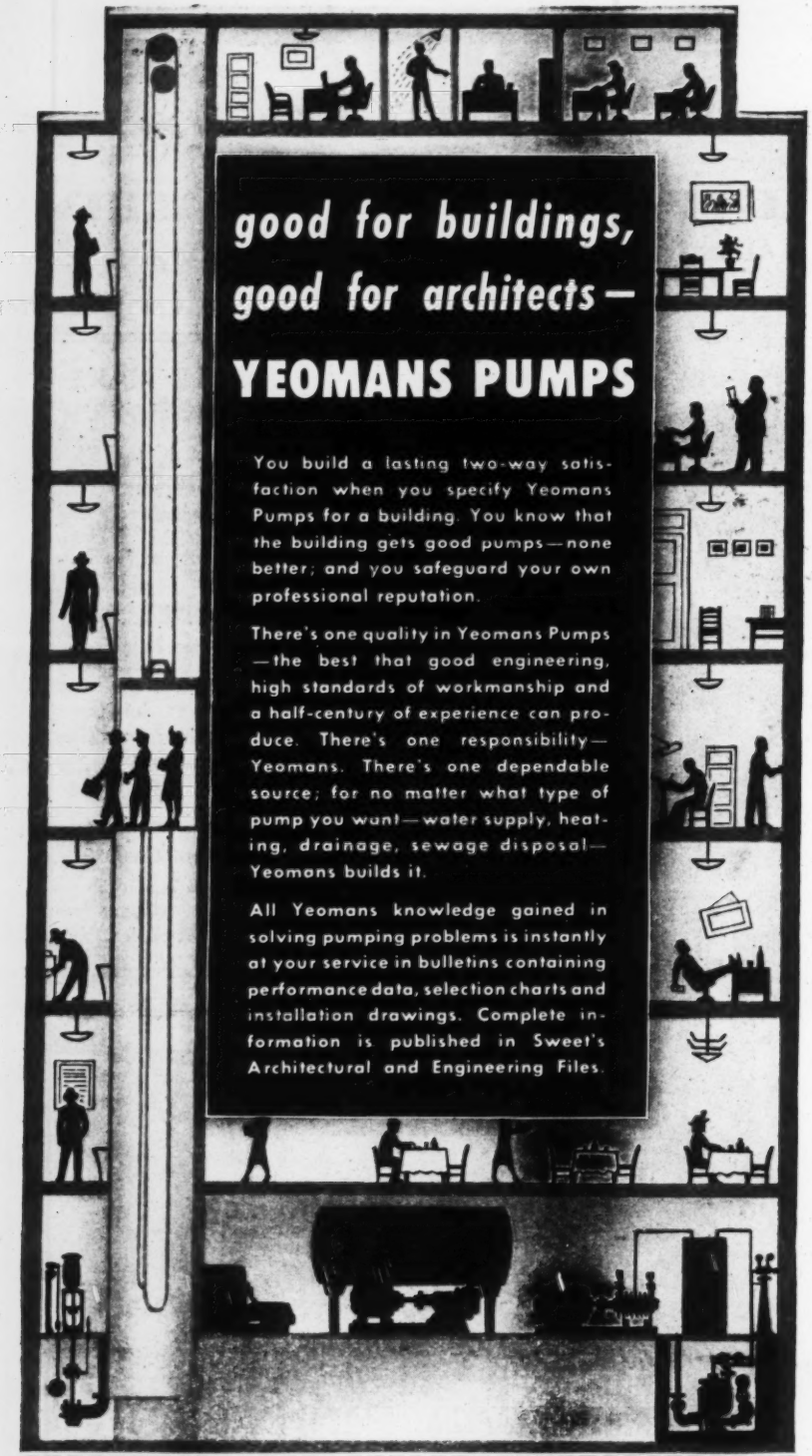

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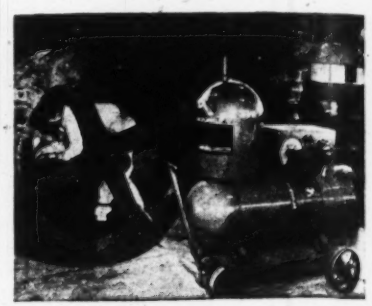
371



MANUAL WELDING EQUIPMENT—Designed for Hidden arc deep flux process employing high current densities. Basic element of unit is a standard 600-amp. welder which can be used for straight manual welding as well as semi-automatic welding. Mounted on welder is compact unit containing wire reel, feed mechanism, drive motor and voltage controls. A special cable is attached to a cone-shaped welding gun, which holds 3½ lb. of flux. Constant arc voltage is maintained by automatic controls. Concentrated heat is sufficient to weld ½-in. plate in a plain butt joint, one pass on each side, without edge preparation. — *Lincoln Electric Co., Cleveland 1, Ohio.*

372

HYDRAULIC JACK—"Lo-Hite" for industrial lifting jobs in close quarters is fitted with independent pump connected to jacking mechanism by a length of rubber tubing. Pump can be operated from any convenient place while jack itself is spotted in close, confined positions otherwise impossible of access. Oil in jack is sealed in, completely isolated from jack exterior, thus permitting use in both vertical and hori-

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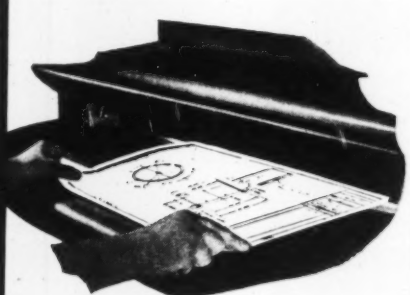

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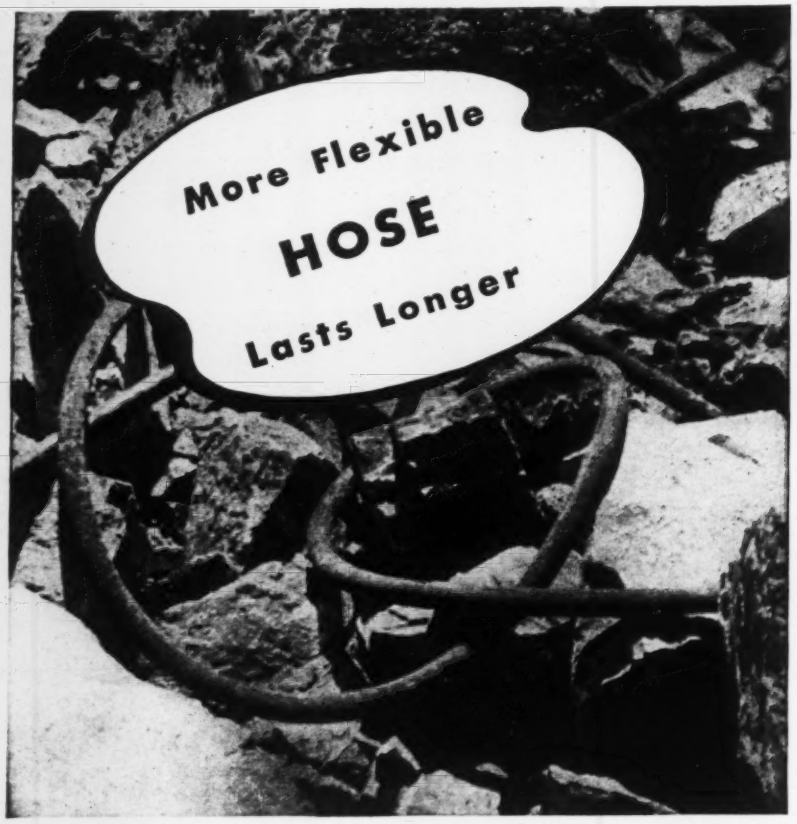

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When hose has to be dragged over the rough and rocky surfaces encountered in construction work, its only salvation is *flexibility*. Hose that is lighter and easier to handle is less likely to be abused. Manhattan engineers had this in mind when they designed HOMO-FLEX. This advanced hose construction follows the modern engineering trends of Strength without Bulk.

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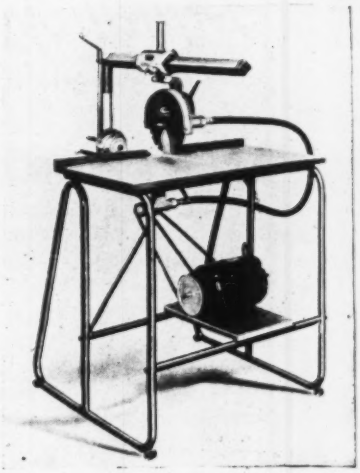
zontal positions. When not in use, the "Lo-Hite" folds into a compact easy to carry unit.—*Duff-Norton Mfg. Co., P. O. Box 1889, Pittsburgh 30, Pa.*

373



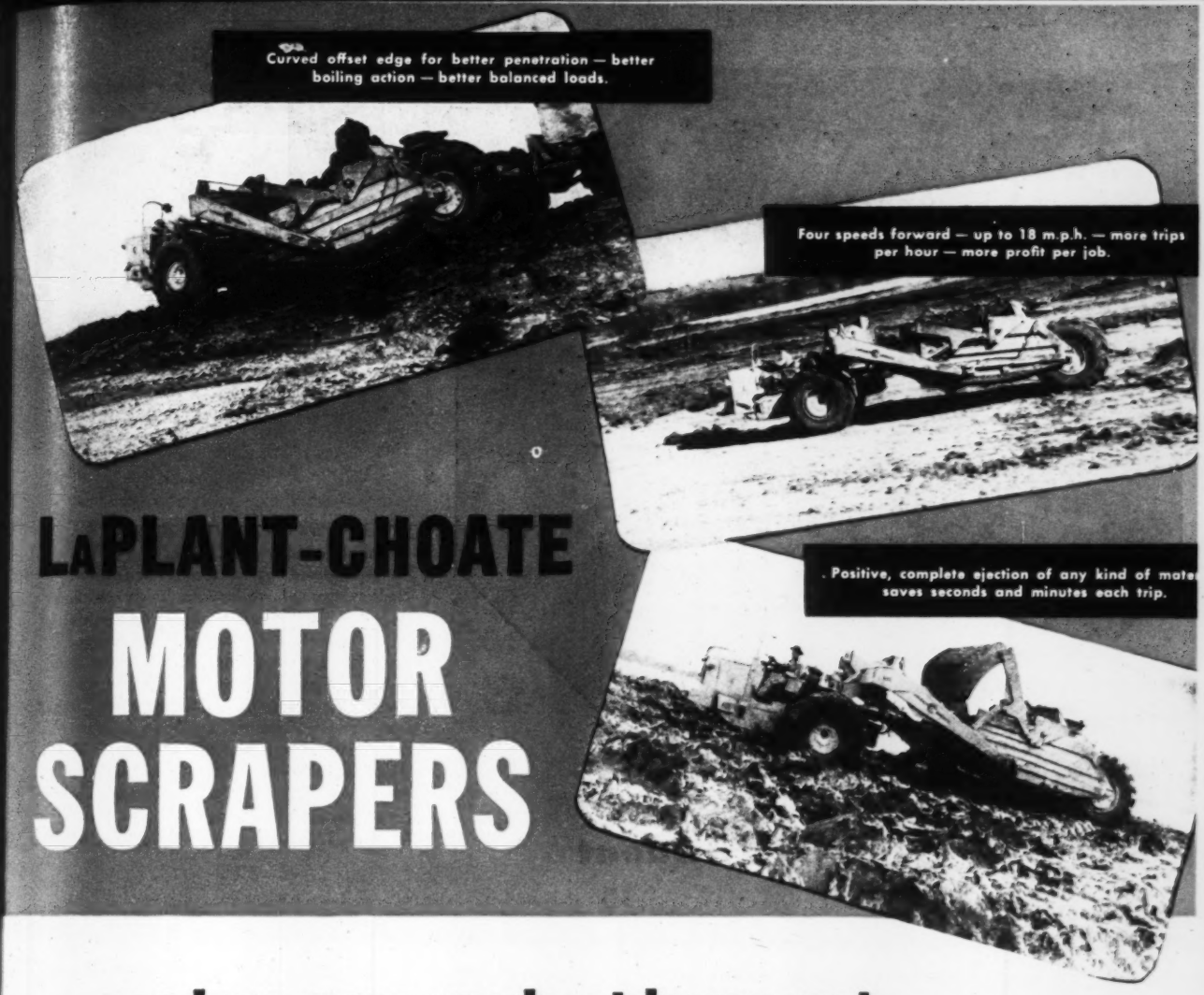
PORTABLE POWER SAW—All-purpose bench saw cuts up to 15 in. wide and 3 in. thick. Table is 16 in. wide, 30 in. long and 30 in. high. Equipped with 8 in. dia. saw operating at 4,500 r.p.m. Flexible shaft drive eliminates motor interference. By loosening two nuts, saw knocks down into two 50-lb. units. Designed to fill gap between expensive stationary power saw and hand tool. Can be turned, tilted, raised, lowered and moved along sliding arm for cutting action or location.—*Foster Mfg. Co., 1 Kinsey Ave., Buffalo 17, N. Y.*

374

MOBILE LUBRICATOR — Trail-Luber is a compact, self-powered unit for servicing construction equipment in the field. Equipment includes: two-compartment hopper for pressure lube and gear lube; two air-operated pumps; two 20-ft. lubricant hoses with suitable adapters; one 25-ft. air hose with air line coupler tire chuck and blower valve; a Briggs & Stratton heavy duty engine rated at 1¾ hp.; and an air compressor with 15-gal. storage tank which delivers 7 c.f.m. Two models available; one skid mounted for easy mobility on pick-up truck or for stationary mounting on dock or platform; the other, easily pulled behind car, truck or tractor, is mounted on automotive type wheels with pneumatic tires.—*Gray Co., Inc., Grace Square, Minneapolis 13, Minn.*

375

MARKING INSTRUMENT—An automatic valve-controlled pocket fountain brush for marking, drawing and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Four speeds forward — up to 18 m.p.h. — more trips per hour — more profit per job.
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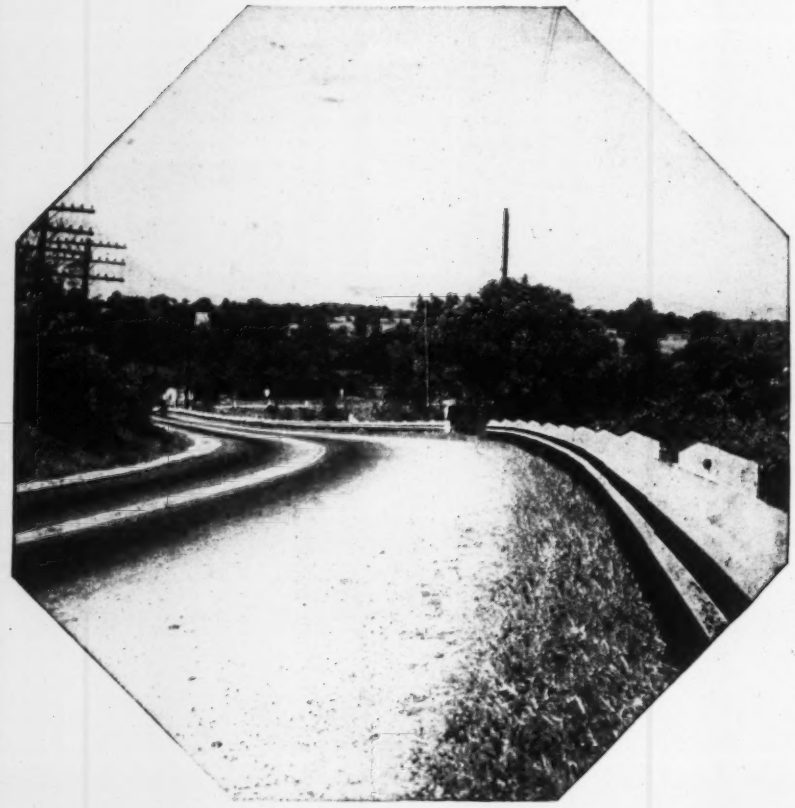

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FLEX-BEAM GUARDRAIL

writing on any surface has been developed. The brush produces a very fine or a broad line by use of a special adapter and four interchangeable nibs. —*Cushman and Denison Mfg. Co., 135 W. 23rd St., New York* 11, *N. Y.*

376

CONVERTIBLE POWER SHOVEL—Buckeye Model 70 Clipper is a ¾-yd. machine designed for tough excavation. Heavy conical roller assembly adds strength. Front end conversion units allow shovel to be operated as crane, trench hoe or dragline. Mevac vacuum power control is applied to all operations of each front end attachment as standard equipment. Machine is powered by three-cylinder G.M. Model 3-71 Diesel engine with hydraulic coupling or with a Chrysler 8-cylinder gasoline engine as optional equipment.—*Gar Wood Industries, Inc., Findlay, Ohio.*

377

RIBBED-TOP CONVEYOR BELT—Designed to prevent back slip in carrying sand, gravel, wet mixed concrete and other "soupy" materials up steep inclines. Chevron-shaped ribs ¼ in. higher than belt surface serve as barriers preventing backwash of materials down belt on inclined operations. New belt is made in widths of 30 to 48 in. —*Goodyear Tire & Rubber Co., Akron, Ohio.*

378

TANK CAR UNLOADER—Pumping unit for unloading asphalt, oil or other thick materials from tank cars has 4-in. Grace gear-type pump, with built-in strainer, driven by 20-hp motor. Trailer or skid-mounted, unit delivers 275 gpm. at 1,800 rpm. engine speed. Other pumping rates are obtainable by sprocket changes.—*W. E. Grace Mfg. Co., Dallas* 15, *Tex.*

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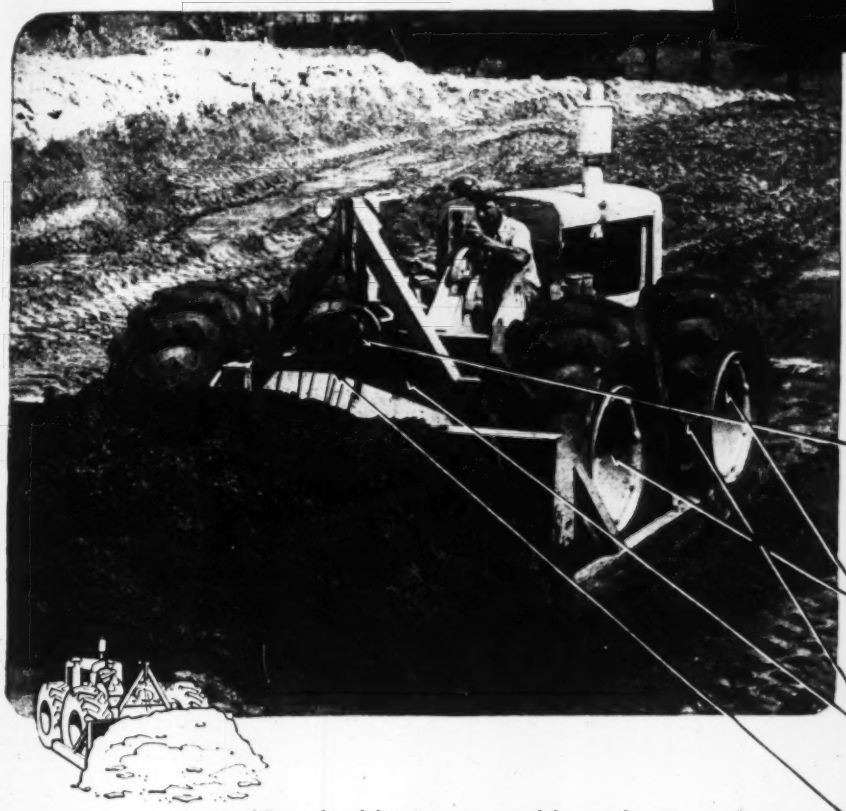

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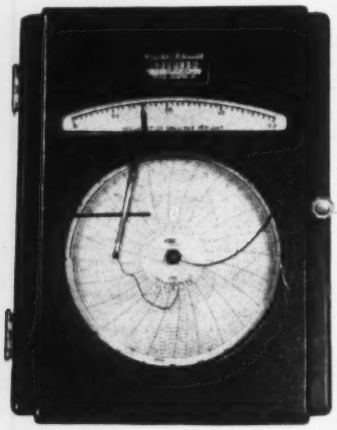

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Type M and Flo-Watch Instruments • Wheeler Filter Bottoms
Master Controllers • Filter Operating Tables • Manometers
Chronoflo Telemeters

BUILDERS PROVIDENCE *Instruments*

Manufacturers' Publications

379

Wire Rope Connector — (32-p. booklet) Fitting of three simple units—sleeve, plug and covering socket—locks cable to make a strong, flexible durable connection. Gateway views show how cable and strands are positively anchored. Three main types of connection are: open end or clevis type; eye end type; and stud end type.—*Electroline Co., 4121 So. LaSalle St., Chicago 9, Ill.*

380

Universal Joints—12-page catalog describes large capacity roller bearing universal joints which are strong and safe because they drive through integral keys instead of bolts. They can be removed from cars or trucks on the road in 20 minutes with a wrench and hammer without disturbing the original balance. Sizes range from 200 to 50,000-ft. lb. torque.—*Mechanics Universal Joint Division, Borg-Warner, 2022 Harrison Ave., Rockford, Ill.*

381

Vibrex Screen —Folder explains the 2-bearing circle-throw principle employed in this screen, which has adjustable stroke and easy angle adjustment. It also shows how the screen, whether floor-mounted or suspended, is always in perfect balance.—Applications and the full range of sizes in single or double deck styles are included.—*Robins Conveyors Division of Hewitt-Robins, Inc., Passaic, N. J.*

382

Self-caulking compound—Manufacture, use and service adaptability of Bond-O, a self-caulking compound for jointing water mains, along with detailed installation instructions, are described in a new catalog.—*Northrop & Company, Spring Valley, N. Y.*

Steel forms—Loose leaf sheets in a pocket-size folder provide data on comparative construction costs with wood and steel foundation forms, descriptions of various types of forms. Provision is made for adding newer data as received.—*Irvington Form & Tank Corp., 43 Cedar St., New York 5.*

383

Built-up Roofs — (28-p. catalog) Specifications for built-up roofing. Drawings and materials specifications

for both hot and cold process built-up roofs. Index shows how to select correct type of bonded built-up roofing. Drawings and specifications give detailed information on surface preparation and application.—*Philip Carey Mfg. Co., Dept. 803, Cincinnati 15, Ohio.*

384

Framing Anchors—(2 page bulletin) Describes and illustrates new type of timber connector known as Trip-L-Grip framing anchors for timber construction to increase rigidity around window and door openings and to provide added strength in floor and corner post framing. Made of 18-gage zinc coated, corrosion-resistent sheet steel, the anchors are joined to the wood with non-splitting full-bodied nails. Booklet gives construction details covering use of anchors in wood frame house plans.—*Timber Engineering Co., 1319 18th St. NW., Washington 6, D. C.*

385

Wire Rope — (119-p combination catalog and handbook) Contains useful information on selecting buying and using wire rope, together with data on fittings, attachment, splicing and other related subjects.—*Wire Rope Institute, 1044 Shoreham Building, Washington 5, D. C.*

386

Cone Crushers—(2-p. folder) Gives specification date and operating information on Symons intermediate cone crushers for rock, gravel and ore reduction. One page is devoted to the recently introduced "package unit crusher."—*Nordberg Mfg. Co., Milwaukee 7, Wis.*

387

Pressure Grouting—(4-p. bulletin) Deals with work including: pneumatic and hydraulic pressure grouting of all kinds ; plastic pressure grouting, weber system with cementations or with inert grouting material; Presscrete construction.—*Presscrete Co., Inc., 743 Graybar Bldg., New York 17, N. Y.*

388

Trucks at Work—Packed with action pictures of trucks, a 16-page booklet covers trucks and tractors, 4- and 6-wheel vehicles, powered by gasoline, diesel and butane-fueled engines. It describes and illustrates practically every type of truck and dump body design used in the specialized hauling of rock and earth.—*Mack Trucks, Inc., 350 Fifth Ave., New York 1, N. Y.*

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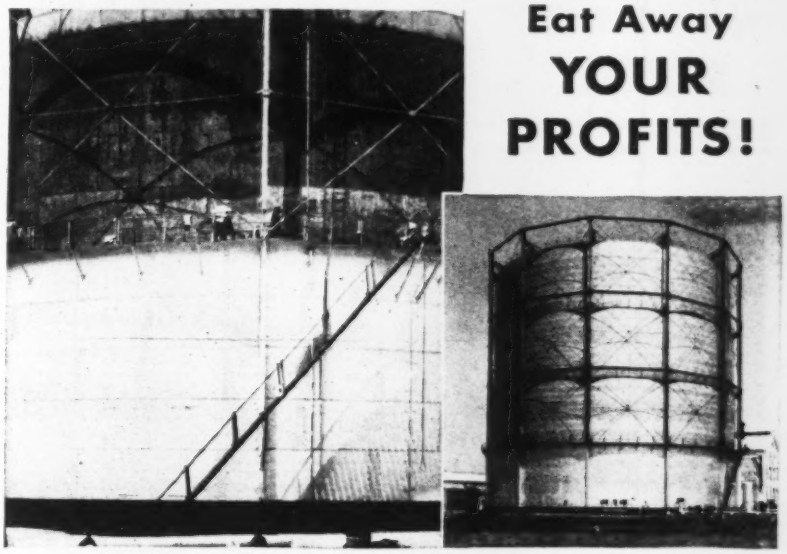

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389

Flexible Coupling—(24-p. booklet) Discusses "relief from bearing wear grief" and problems of power transmission loss and prematurely worn bearings. Explains functions of flexible couplings and three types of shaft misalignment.—*American Flexible Coupling Co., Erie, Pa.*

390

Crankshaft Grinder—(4-p. folder) Engine rebuilding tool works from top of block and is claimed to reach the end cylinders with the same ease as those in the center of the block. Eliminates need for handling heavy parts under chassis. Equipped with hand micrometer feed.—*Waterbury Tool Division, Vickers, Inc., Waterbury 91, Conn.*

391

Woven Wire Screens—4-page folder tells of screens for vibrators, shakers, cones, and cylinders. They are said to be especially rugged and efficient.—*Pacific Wire Works Co., 4515 Sixth Ave. South, Seattle, Wash.*

392

Metal-cutting Tool—An 8-page bulletin describes a surface and underwater metal cutting tool that uses an electric arc vapor and pierces, cuts or chamfers cast iron, stainless steel, aluminum and other metals difficult to cut by ordinary methods.—*Eutectic Welding Alloys Corp., 40 Worth Street, New York 13, N. Y.*

393

Macadam Pavements—An informational bulletin has been issued by a technical organization for research and engineering study to improve and develop macadam pavements. It describes approved construction methods, and gives typical sections of pavements built and under construction.—*Macadam Pavements, Inc., 1018-19 Huntington Bank Bldg., Columbus 15, Ohio.*

394

Smoke Abatement—A 16-page booklet on modern smoke abatement practice shows how overfire jets provide the turbulence and oxygen to burn volatile matter from coal before smoke can be formed. The booklet tells what causes smoke and how it can be prevented.—*Bituminous Coal Research, Inc., 912 Oliver Bldg., Pittsburgh 22, Pa.*

395

Weldability Directory — Condensation of a U. S. and Canadian engineering survey designed to show weldability of several thousand major and

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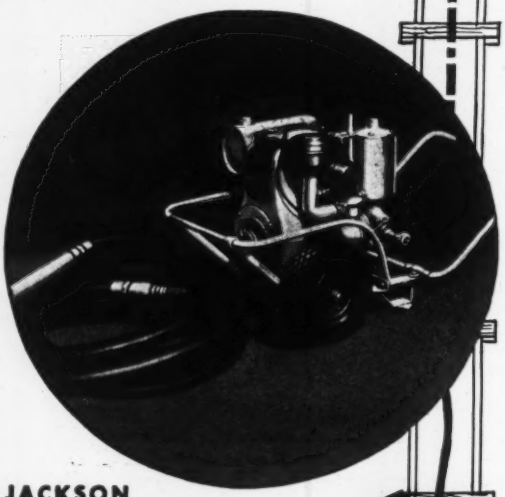

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minor commercial alloys, as revealed by type of weld, equipment design, and practical application of special gas and arc welding rods, has been accomplished in an 8-page, 3-color technical directory recently made available.—*Eutectic Welding Alloys Corp., 40 Worth Street, New York 13, N. Y.*

270

Concrete Design—Complimentary reprints of two specifications are available from the manufacturers of Pozzolith, a cement-dispersing admixture, as an aid in designing concrete mixes based on the water-cement ratio law. One is the American Concrete Institute specification "*Standard Recommended Practice for the Design of Concrete Mixes*" while the other is that of the American Society for Testing Materials entitled, "*Tentative Specifications for Ready-Mixed Concrete.*" To date, 20,000 copies of each specification have been mailed to persons in this country, and requests have been received for over 5,000 additional copies of each. The ACI specification also is available in Spanish translation.—*Master Builders Co., 7016 Euclid Ave., Cleveland 5, Ohio.*

271

Piles for Different Purposes—A very handsome 50-page book describes and illustrates the various types of Raymond piles for different foundation conditions. These subheads indicate the scope of the work: The Organization Behind a Raymond Job; Piles, their Functions and Types; Step Taper Piles; Composite Piles; Precast Concrete Piles; Caissons, Steel Pipe Piles; Steel Bearing Piles; Carrying Capacity; The Value of the Shell; Working Loads; Load Tests; Pile Spacing and Group Arrangement; Soil Borings; Special Concrete Work; and Types of Pile Drivers. Every constructor needs this book—*Raymond Concrete Pile Co., 104 Cedar Street, New York 6, N. Y.*

272

Diesel Tractor—(24-p. booklet) Features International TD-24 crawler tractor and "planet power steering" claimed to be a new design development in the crawler tractor field. Use "picture story" technique to portray working functions of important tractor parts. Hydraulically controlled steering system gives new handling ease.—*International Harvester Co., 180 N. Michigan Ave., Cleveland 1, Ill.*

273

Stainless Steel Data—An entirely new group of data has been collected and presented in this new 36-page, 8½" x 11" handbook, comparing qualities,

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The extra passenger space and speed allows us to take prospective customers to "see for themselves" on similar installations at distant points or in the "home" factories. Sales usually result. We believe that sales influenced by the use of the Bonanza more than paid for it during its first six months.

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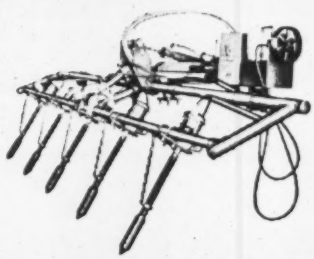

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725 S. Flower St., Burbank, Calif.

characteristics, uses, mechanical physical, electrical, magnetic, heat resisting and corrosion resisting properties of stainless steels.—*Alloy Metal Wire Co., Inc., Prospect Park, Pa.*

274

Welded Design Guide—(6-p. pamphlet) Explains use of proper welding symbols to simplify drafting problems. Also tables of properties of base metals, weld metals, safe loads for fillet welds, and length of fillet weld to replace rivets.—*Lincoln Electric Co., Cleveland 1, Ohio.*

275

Dual-Fuel Attachment for Diesel Engine—(4-p. pamphlet) Emphasizes versatility of engine when attachment is added, and points up the economic operation of the entire unit when utilizing natural gas.—*Caterpillar Tractor Co., Peoria 8, Ill.*

276

Adhesives in Industry—(28-p. brochure) Deals with bonding operations such as plywood-to-metal and vinyl-sheeting-to-wood, sealing operations, protective and anti-corrosion coatings for metal.—*Minnesota Mining & Mfg. Co., St. Paul, Minn.*

277

Tandem Roller—(8-p. pamphlet) Information on new 35-ton tandem roller for compressions ranging from 109 to 171 lb. per in. of roll width. Detailed construction views, data and complete specifications are given in Catalog 305.—*Galion Iron Works & Mfg. Co., Galion, Ohio.*

278

Asphalt Tile Flooring—(4-p. leaflet) Hints on installation and maintenance of asphalt tile flooring. Also specification data and warranty.—*Mastic Tile Corp. of America, 153 W. 57th St., New York 19, N. Y.*

279

Concrete Carrier—Pamphlet illustrates use of Dumpcrete body by ready-mixed concrete industry to haul air-entrained concrete, without agitation.—*Maxon Construction Co., Inc., 131 N. Ludlow St., Dayton 2, Ohio.*

280

Emery Aggregate for Concrete Floors—(12-p. pamphlet) Lists advantages claimed for Emeri-Crete flooring including hard surface, resistance to wear and smoothness and freedom from ruts.—*Walter Maguire Co., Inc., 330 W. 42d St., New York 18, N. Y.*

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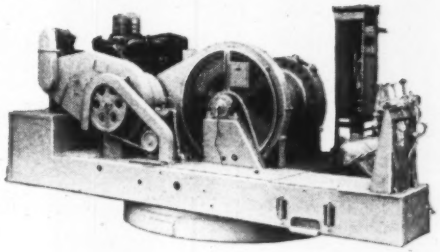

●It's what you don't see in this picture of the DIESELECTRIC machinery deck that's important. First, all travel machinery is gone—because the electric traction system is all in the underbody. There's no pyramiding of machinery. Tail swing has been shortened by two feet. Walkways are clear, open, safe. All units needing repair or lubrication are instantly accessible. Result: lowest maintenance costs in locomotive crane history!

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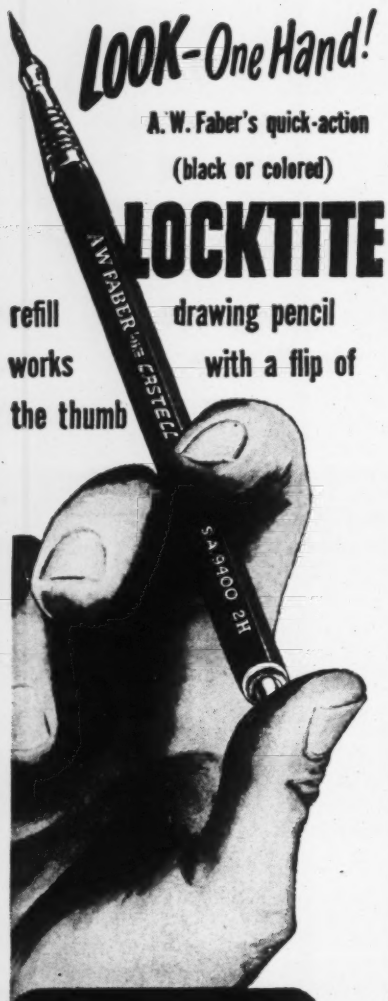

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Men and Jobs

Lawrence M. Fisher, engineer director of the U. S. Public Health Service, has been appointed to the Inter-state Commission on the Potomac River Basin, succeeding the late Ralph Tarbett. He has been in public health work for 36 years and a member of the PHS staff for 30 years. He participated in the organization of the Inter-American Association of Sanitary Engineers at Caracas, Venezuela, last year.

Tim de Jong, engineer of Astoria, Ore., has been appointed to a post in the public works ministry of Afghanistan, where he will do general engineering work in irrigation, flood control, water supply, roads and bridges. He expects to remain abroad at least two years.

J. R. Bradfield, construction engineer of Toronto, Ont., has been named president of the St. Lawrence Contracting Company Ltd. of Belleville, Ont. **S. M. Connolly,** of Belleville, recently assistant manager of Anglin Norcross Ontario Ltd., becomes vice-president; and **St. Clair Hurlburt,** of Belleville, who formerly was district engineer at Kingston, Ont., becomes managing director.

Curtis J. Hooper, of Glastonbury, has been appointed director of highway planning studies in the Connecticut State Highway Department, according to a recent announcement by Commissioner G. Albert Hill. He succeeds **Roy E. Jorgensen,** who was appointed a deputy commissioner.

Charles Hallman, specialist in the engineering and construction of industrial buildings, formerly with the H. K. Ferguson Co., has joined Crump, Inc., Pittsburgh, Pa., as head of its industrial department.

John M. Fitzgerald has been appointed chief engineer of the New York City Board of Water Supply, succeeding **Roger W. Armstrong,** now chairman of the board of consultants. He received his B.S. in civil engineering from Manhattan College in 1907, and

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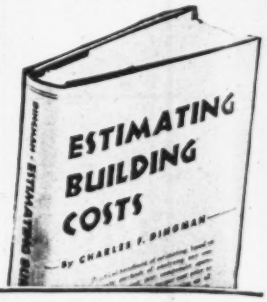

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This handy pocketbook insures accurate estimates for building construction . . . helps save time and error in determining profitable, competitive prices. Based on the most practical experience, it is full of helpful pointers for new or experienced estimators, shows them how to determine quantities of labor and amounts of material to produce a unit of completed work in practically every branch of building construction.

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By SABIN CROCKER, Mechanical Engineer, Ebasco Services, Inc. *Fourth edition,* 1576 *pages,* 534 *illustrations,* 329 *tables,* $7.50

Makes available to the engineer, designer and contractor a vast compilation of the data necessary for the most effective use of piping in its important industrial applications. The work of a staff of specialists, it presents every needed fact, covering scientific fundamentals, materials, and most effective methods. Problems of steam and power plant piping, heating, plumbing and water-supply systems, oil and gas piping, etc., are discussed—practical methods of solution indicated.

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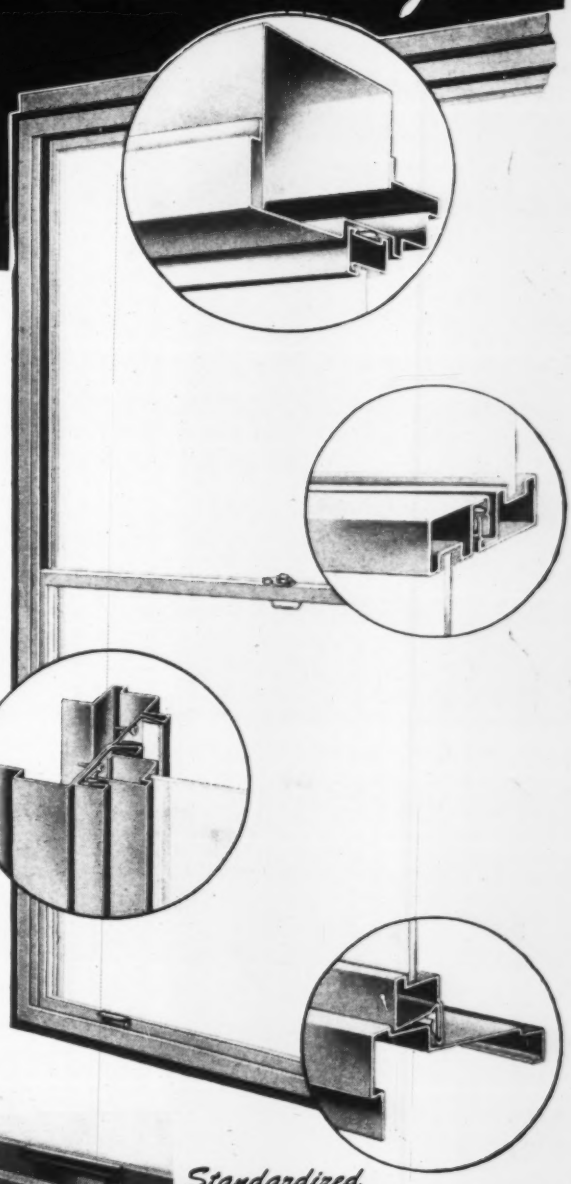

● This outstanding window is an original development by Truscon. It is an economically priced unit in the popular double-hung design, and enjoys widespread use in residences, schools, hospitals, office buildings, etc. Recent construction developments in the Series 138 Truscon Double-Hung Steel Window include:

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MEETING RAILS AND SASH —Stainless steel weatherstripping attached to sash at head and sill provides an effective seal against air infiltration along all weathering contacts. Interlocking tubular sash rails with stainless steel weatherstripping, lift handles, sweep lock, strike and pull-down handle, rust-proofed and painted to match window. 18 gauge sash members.

JAMBS —Full length stainless steel weatherstripping attached to frame members at jambs assures weather-tightness and also serves as sash-way for both upper and lower sash for easier operation. Plaster stop provided on interior and rebate for screens and storm sash on exterior. Deep bead. 18 gauge jamb frame members.

SILL —Double step design affords two point weathering contact with sash. Heavy 16 gauge steel for strength and rigidity.

In addition to all these features, sizes of the Series 138 Truscon Steel Window have been changed to agree with principles of modular planning. Another important feature is the tubular construction of the sash members adding greatly to the strength, durability and finished appearance of the window.

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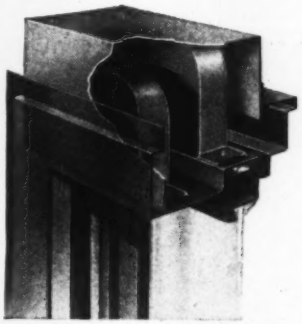

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Sweep Lock

Pull-Down Handle

Lift Handle

Standardized

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Frames of the Series 138 Truscon Window are prepared to receive screens and storm sash of the simplest and most economical type, as made by Truscon.

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entered the board's service permanently in 1907. The only interruption since was his period of service in the Army as an engineer in the first World War. His early work was in the vicinity of the Ashokan reservoir and down through the years he has done important work in connection with New York City's reservoirs. In January, 1945, he became deputy chief engineer and moved to headquarters. **Victor C. Brownson** has succeeded Mr. Fitzgerald as deputy chief engineer; Max P. **Freund** succeeded Mr. Brownson as watershed department engineer; **Charles G. Hoerner** succeeded Mr. Freund as senior division engineer; **George Spann** succeeded Mr. Hoerner as division engineer of the Lackawack division, and **Francis J. Colgan** was promoted to senior section engineer at Lackawack.

A. Willard Dudley is now in charge of all physical testing and field inspection at the Allentown, Pa., Testing Laboratory. He holds a master's degree in engineering from Pennsylvania State College. From 1936 to 1948 he was with E. L. Conwell & Co., Philadelphia, Pa., and directed the testing and inspection on many war, federal and Metropolitan Life housing projects in New York City.

W. J. Scofield, office engineer for the Portland, Ore., division office of the Public Roads Administration since 1922, has retired after holding key positions for 30 years. A 1908 civil engineering graduate of Iowa State College, he served as assistant engineer of Aberdeen, Wash., and with the Oregon and Montana highway departments before entering federal highway work as a levelman in 1918 at Missoula, Mont.

Robert F. Hutchinson has been appointed engineer of Boone County, Ind., in place of Arthur MacArthur, resigned. **John W. Fulwider,** former county engineer, is Hutchinson's deputy.

Arthur Ellwood, of the Knappen Tippetts Abbett Engineering Co., New York, has been assigned as project manager to head the survey and preparation of a report on the Delaware River Port to be submitted to the Delaware River Joint Commission of Pennsylvania and New Jersey. Mr. Ellwood returned recently from Greece where he was in charge for the Knappen Engi-

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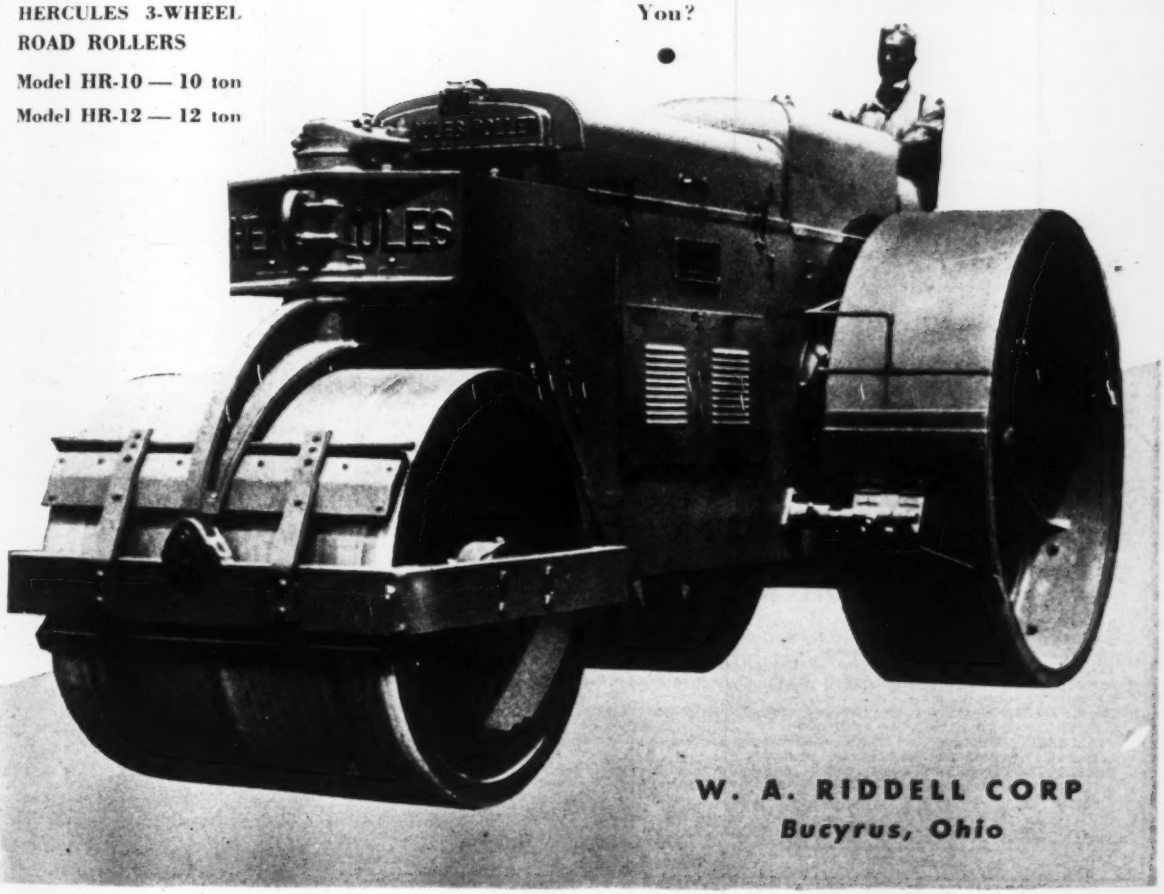

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neering Co. on design in connec with the rehabilitation of the Gr ports and the Corinth canal. The Kn pen Tippetts Abbett Engineering has opened a branch office in Ph delphia with **Edward K.** Bryant charge. During the war Mr. Br was a commander in the Civil E neering Corps, United States N Previous to joining the Knappen E neering Co. and service in the N Mr. Bryant headed his own consul engineering office.

After serving in federal and engineering positions for more than years—19 of them with the Corps Engineers — **Clayton L. Baldwin,** of Albuquerque, N. M., retired from government service recently.

He was chief of the preliminary examination and surveys and hydrological section, in the Albuquerque District Office, Corps of Engineers, and was respons for the assembly of data and prepa tion of authorized preliminary exa nation, review and survey reports; development and operation of the trict's flood prediction system; sto studies; sedimentation studies; flood control operation program for existing reservoirs, and the distr stream gaging program.

In his last assignment, Mr. Baldw was responsible for the assembly data and preparation of the "Report Survey for Flood Control, Rio Gran and Tributaries, New Mexico," cently submitted to the Chief of En neers after approval by the district division engineers. To be submit to Congress, it recommends a comp hensive plan of flood control for Middle Rio Grande Valley.

During his 19 years with the Co of Engineers, Mr. Baldwin served the Memphis District, as well as Kansas, Oklahoma and New Mexico fices of the Southwestern Division. received his C.E. degree from Syra University, in June, 1907, and began engineering career the same year w New York State.

John C. King, who was senior e gineer for the International Engineer Co., Inc., of Denver, Colo., has beco chief engineer of the Prepakt Concr Co., Cleveland, Ohio. He is a gradua of M.I.T. and joined the Bureau Reclamation in 1933. For several yea he taught civil engineering at Rob College, Istanbul, Turkey. He was major in the Corps of Engineers in Philippines during the war.

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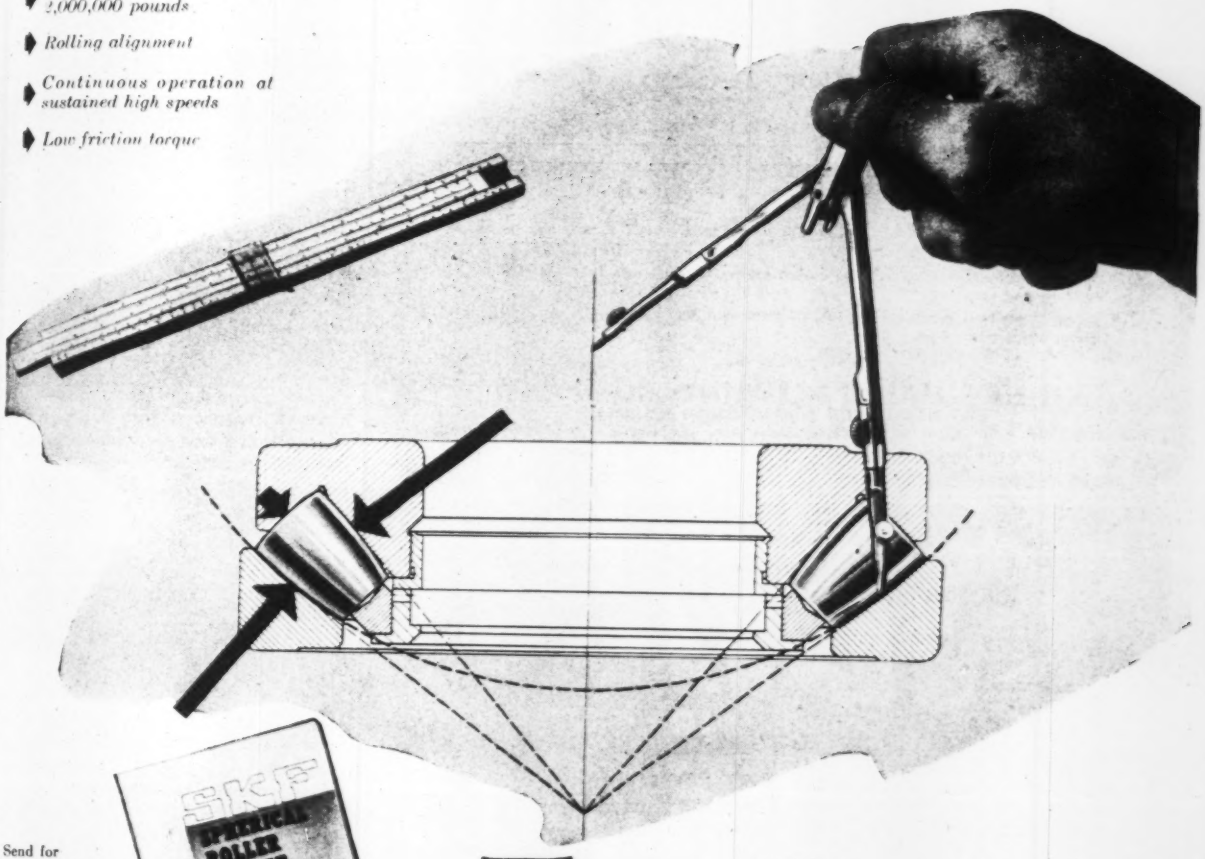

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The rollers are so shaped that load components firmly contact the roller ends against the unusually high guide flange. This assures positive guiding of the rollers without excessive pressure on the roller ends.

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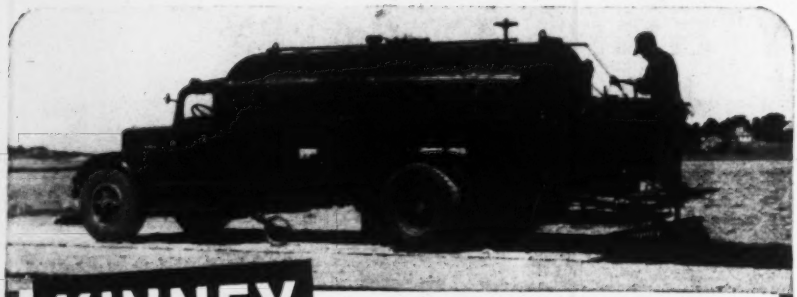

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Elections and Activities

The Washington, D. C. Engineers Club has opened permanent downtown quarters in the National Theater Building. Several hundred members and guests attended a reception recently to celebate the occasion.

Membership in the club is limited to engineers and architects. Civil engineers make up the largest number from any of the professional branches at present. Even before establishing its own clubhouse facilities, the club's membership had grown to 300. With 8,000 engineers reported in the District of Columbia, the club is expected to add members steadily. Luncheon will be served each business day.

F. A. Leser, of the American Society of Heating and Ventilating Engineers, is president.

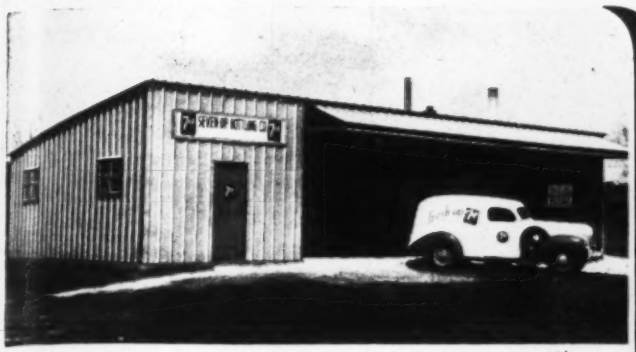
R. E. Setterstrom of Butte has been elected president of the Montana Society of Engineers, with E. A. Champ, also of Butte, first vice-president; E. A. Barnard, Anaconda, second vice-president; R. D. Pipe, Butte, secretary-treasurer; and F. C. Homann of Bozeman and E. C. Shevalier of Great Falls, trustees.

G. B. McGough has been elected president of the American Wood Preservers Association, succeeding A. J. Loom. J. S. Giddings was elected first vice-president; F. W. Gottschalk, second vice-president, and H. L. Dawson, was retained as secretary-treasurer.

L. E. Finch, Indianapolis, Ind., president of the Indiana Society of Professional Engineers, was elected president of the Indiana Engineering Council at a recent meeting in Indianapolis, to succeed Chester Lichtenberg, Fort Wayne. Robert E. Gallatin, Fort Wayne, was named vice-president.

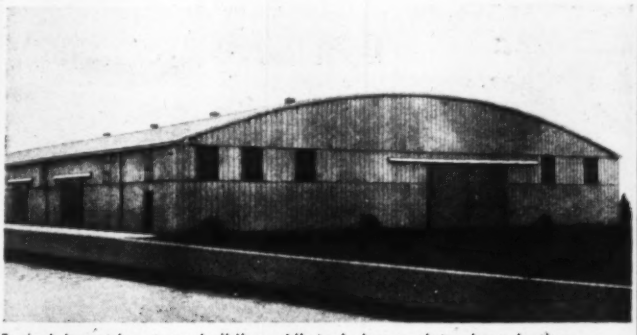
The Engineering Societies of New England have elected Dean William C. White, director of the day divisions at Northeastern University, president. Formerly dean of Northeastern's college of engineering, White was regional advisor to the U. S. Office of Education in the engineering, science, and management war training program.

The Connecticut Steel Fabricators and Erectors Association, Inc., has elected the following officers: President, C. L. Nelson, Leake & Nelson Co., Bridgeport; vice-president, R. C. Tay-

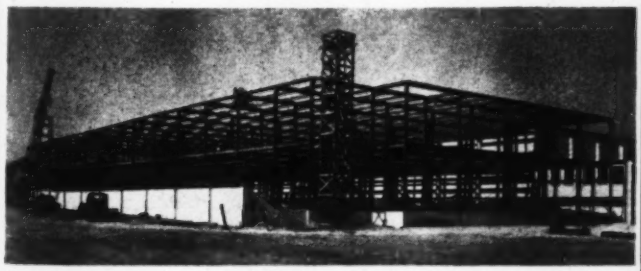


Garage - workshop - storage - implement shed. Equipped with 40' 0" canopy door that opens and closes with remarkable ease in less than a minute. Building 54' 4" wide x 25' 9" deep.

One of many design variations in our all-purpose steel buildings, showing combination front of three 13' 6" panels — one with access door, one with swing doors and one a solid panel. Can be extended in 13' 6" sections. Building depth, 25' 9"



Typical bowstring truss building. All-steel, heavy duty, long lasting general purpose building. This model 100' wide x 200' long x 15' high. Other sizes available.



If it is built of steel, International is your best source of supply. For example, the steel requirements for this large Florida manufacturing plant were met efficiently and economically from International's available steel.

Sure... SOME TYPES OF STEEL ARE TOUGH TO FIND but...

. . . where conventional construction is currently impossible, our skilled engineers, complete facilities, long experience and wide variety of materials may offer an economical and completely satisfactory solution to your problems.

Ranging from small storage buildings to factory installations covering large areas, there is an all-steel building by International Steel Company adaptable to almost any general or special purpose.

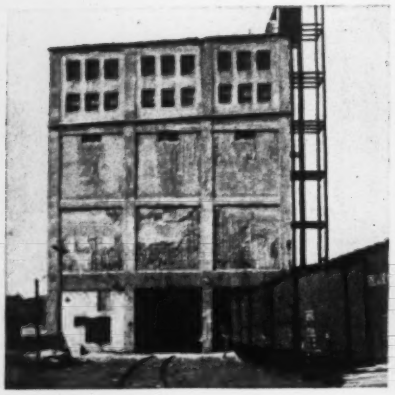
Use of factory-built special or standard all-steel units affords builders an opportunity to widen their scope of activity and increase their business volume despite material shortages.

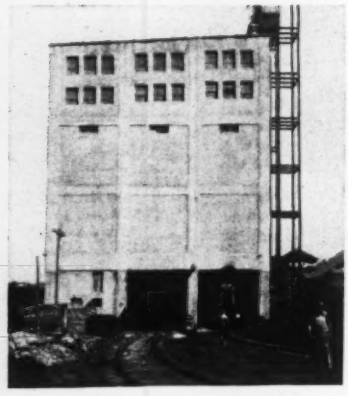
These exceptionally rugged and tough all-steel buildings are not "temporary" structures. They will take all that nature and hard use can give them, retaining their utility and trim appearance year after year. Models available, too, for use in combination with masonry.

Whether for complete jobs or structural parts, it will pay you to find out how International Steel might help you beat the materials shortage. Write us your needs.

INTERNATIONAL STEEL COMPANY

1609 EDGAR STREET **EVANSVILLE 7, INDIANA**





"GUNITE" RESTORES CONCRETE BUILDING

The before and after photos show the breaker building at Cayuga Rock Salt Company, Myers, N. Y. This concrete building was badly disintegrated due to salt action on the reinforcing steel. In 1946 we contracted the complete reintegration of the walls and roof of this building.

The disintegrated areas of the walls were chipped and the entire surface washed and sandblasted. Reinforcing mesh was placed over the entire area and 1½" minimum "GUNITE" applied, and brush finished. The roof slab was similarly repaired with "GUNITE," both top and bottom. Sufficient old concrete was chipped away to prevent increasing the dead load of the roof slab.

"GUNITE" is impervious, thus it will not permit the infiltration of salt brine to attack the reinforcement. Its use as armor against sea water and conditions such as above described is very common, and its success remarkable.

Write for our free 72-page descriptive bulletin A-2300.

CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

HYPRESSURE Jenny

STEAM CLEANER

CLEANS CONSTRUCTION EQUIPMENT

8 to 10 Times Faster

Increases "On-The-Job" Efficiency

Cuts Repair Time as Much as 40%

Saves Time... Labor... Money

Mud, dirt, and grease are instantly removed from all types of machinery and equipment when Hypressure Jenny's highly atomized mixture of steam, hot water and cleaning compound is applied. Hypressure Jenny cleans thoroughly, quickly—so *fast* that one man using Hypressure Jenny can do more cleaning in one hour than 10 men can accomplish in the same time by hand methods. Hypressure Jenny Steam Cleaning of equipment before repairs saves up to 40% of your mechanics' time which otherwise would be lost fighting dirt and grease.

There are hundreds of other savings in time, labor and money Hypressure Jenny can effect for you. Why not write for further details? No obligation.

HYPRESSURE JENNY DIVISION

Homestead Valve Manufacturing Co.

P. O. Box 31 • Coraopolis, Pa.

lor, Berlin Construction Co., Berlin; secretary-treasurer, W. P. Shahan, New England Iron Works, New Haven; director for two years, Mark Jasevitch, Standard Structural Steel Co., Hartford; and director for a one-year term, G. W. Lyons, the Bilco Co., New Haven.

W. W. Gillespie, Jacksonville, has been elected president of the Florida Engineering Society. Other officers chosen were: A. P. Nichaels, Orlando, first vice-president; E. A. Nordstrom, St. Petersburg, second vice-president; David B. Lee, Jacksonville, re-elected treasurer; Earle Rader, Miami, was re-elected a director from District Three and R. A. Menendez, Tampa, was chosen as the new director from District Two.

At the annual meeting of the Central Nebraska County Officials Association, A. B. Holmburg was re-elected president. Mr. Holmburg is also president of the Nebraska Association of County Supervisors. Other officers elected were Frank Komsack, St. Paul, Neb., Howard County commissioner, vice-president; and Fred Schaffroth, Hastings, who was re-elected to the post of secretary-treasurer.

Leif J. Sverdrup, president of the Council of Metropolitan St. Louis, who was elected to that office on March 15 to succeed George B. Logan, resigned, and all other officers of the council were re-elected at a meeting of the group's board of directors. Sverdrup, who holds the rank of major general, is a member of the consulting engineering firm of Sverdrup & Parcel, St. Louis, Mo.

Following the approval last January by the Executive Committee of the New York State Sewage Works Association of the petition to form a Metropolitan Section in the New York area, members of the parent organization met and organized recently. To serve on the executive committee will be Arthur J. Scanlon and Anton E. Sparr, both operators in New York sewage treatment works, and A. J. Fischer and Paul Cerny, representatives of equipment manufacturers, and Wm. A. O'Leary of the design department of New York Public Works, and M. H. Klegerman a consulting engineer. Marshall E. Ferguson of the Office of the Interstate Sanitation Commission of New York was elected secretary. Messrs. Sparr and Cerny will serve one year, Messrs. Klegerman and Scanlon two years, and Messrs. Fischer and O'Leary three years. Elected to the chairmanship of the Metropolitan Section was Arthur J. Scanlon.

★ *Answering Your Questions About Bruning BW Direct Process Prints*

Q. How will the BRUNING BW process speed my product development?

A. Bruning Colored Line Prints—red, blue or brown lines on white, pink, or green tinted backgrounds—clearly indicate alternate designs or various steps in product development. And you get BW Prints *quickly*—because these positive prints are made directly from your original tracings without the use of a negative.

Q. Will I need special accessory equipment?

A. No—Bruning BW equipment requires no plumbing connections, either for water supply or drains. There are no exhaust ducts or blower motors to install. Easy to move on its casters, BW equipment can be placed anywhere in your office or plant where electric outlets are available.

Bruning small-volume continuous printer and developer.

Q. Can I produce prints on cut sheets?

A. Yes, Bruning BW Prints can be produced on sheets cut to the exact size of your tracings. Or, if you prefer, BW Prints can be produced on roll stock up to 42 inches in width. Whichever method you prefer, you need only one operator.

Q. How will the BW process save my valuable tracings?

A. BW Transparent Prints (intermediate prints) provide exact duplicates of your original valuable tracings for unlimited production of subsequent BW Prints. Unwanted portions may be deleted on the BW Transparent with BW Eradicator—and new versions redrawn in pencil or ink. All subsequent BW Prints reproduced from the BW Transparent will then bear the new version.

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"Big Machine"
STAMINA
"Little Machine"
MOBILITY

It's the
NELSON K-5

TOUGH jobs on the road and tight spots in the yard never stymie a Nelson K-5. Watch this nimble loader as it responds sensitively to operator's touch. Here's *toughness* for the pit or road—plus *agility* for the busy yard. Here is that rare combination of ruggedness and flexibility that you've been looking for.

More, a Nelson K-5 is economical to buy and economical to operate. Watch it do hard work the easy Nelson way, "picking before it shovels."

Other features include two-strand elevator . . . Twin Disc clutches . . . four-speed transmission . . . self-steering tow bar for quick, easy movement between scattered jobs.

Use a Nelson K-5 for quicker, lower cost loading. Watch it run circles around bulkier, less responsive machines. Write for details and prices.

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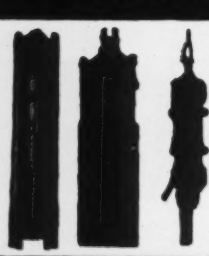
N. P. NELSON IRON WORKS, INC.
CLIFTON, N. J. • *Truck Loaders Since 1917*

McKiernan-Terry



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Now made in sizes of complete, standardized line of ten double-acting hammers, five single-acting hammers and two double-acting extractors. Write us for free descriptive Bulletins 55 and 57.

MK-397

McKIERNAN-TERRY CORPORATION MANUFACTURING ENGINEERS
13 PARK ROW, NEW YORK 7, N. Y.

Manufacturers' Activities

Current developments among manufacturers relating to expansion of services, shifts in personnel, and other changes, include the following:

Personalities—L. A. Franks is manager of the Boston district office of the H. K. PORTER CO., INC. . . . Howard M. Hubbard is the new president of THE HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio . . . Charles S. Weber has been made advertising manager of THE THEW SHOVEL CO., Lorain, Ohio . . . W. F. Detwiler, chairman, has been made honorary chairman of ALLEGHENY LUDLUM STEEL CORP. and Lester H. Bittner is now vice-president in charge of purchases . . . James A. Vincent is senior field engineer for the LE TOURNEAU CO., Peoria, Ill. . . . Howard H. Weber is chief engineer of the wire and cable department of U. S. RUBBER CO. and A. S. Basil, general sales manager . . . W. O. Taylor, retiring manager of the ALLIS-CHALMERS TRACTOR division export department will be succeeded by M. J. Proud . . . C. F. Larsen is manager of general service and C. A. Slifer, assistant, for MACK TRUCKS, INC., Plainfield, N. J. . . . Miles S. Wright is superintendent and Charles E. Stroud, assistant, of PITTSBURGH PLATE GLASS CO.'s new "Twindow" plant at Creighton, Pa. . . . Appointment of two new district managers has been announced by the NEW HOLLAND MANUFACTURING CO., Mountville, Pa., a division of the New Holland Machine Co. Keith B. Hubbard is serving the New York State and New England territory, and A. E. Ainlay is in charge of the Western district, including California, Oregon, Washington, Montana, Wyoming, Utah and Colorado.

Deceased—Peter D. White, 59, recently elected president of THE BABCOCK & WILCOX TUBE CO. died May 6 . . . Les C. Wilson, 47, president and sales manager of the CALREISIN CORP., Culver City, Calif., died April 27 in Los Angeles . . . Monroe F. Rubin, 64, head of the LAKESIDE EQUIPMENT CO., INC., Cleveland, Ohio, was killed in an automobile accident near Ashland, Ohio, on May 2.

Sales—H. Wilson Hubert is district sales representative of THE MARION POWER SHOVEL CO., in charge of the Pittsburgh, Kan., office . . . George M. Catchpole has been made assistant manager of the fleet sales section of the FORD MOTOR CO. . . . Wm. S. Saylor

Pouring concrete over Bethlehem Reinforcing Bars, shown in place atop one of six culverts built for new road.

Relocation Job in Northern New York

Pushing the mud around. Earth-moving equipment at work on grading for the new highway.

With strike-off completed, husky Bethlehem Bar Mat is moved into place. Job called for 62,000 sq yd of mats.

Close-up of screed as it spreads final course over Bethlehem Bar Mat.

Joseph Powers, junior engineer (left), and Austin Sarr, resident engineer, both of N. Y. State Highway Dept., glance approvingly at one of numerous construction details encountered on the job.

New York's Route 56, well-known highway from the Adirondacks northward to Massena and the Canadian border, recently underwent relocation near the junction with Route 72, south of Potsdam. These pictures show phases of the construction along a 4¾-mile stretch of the new road built by Warren Brothers Roads Co., Syracuse, N. Y. Reinforcing bars and bar mats were furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Leading Bethlehem Highway Products

Road Joints • Reinforcing Bars • Bar Mats
Guard Rail • Guard Rail Posts
Wire Rope and Strand • Hollow Drill Steel
Spikes • Bolts and Nuts
Timber Bridge Hardware • Tie-Rods

BETHLEHEM STEEL

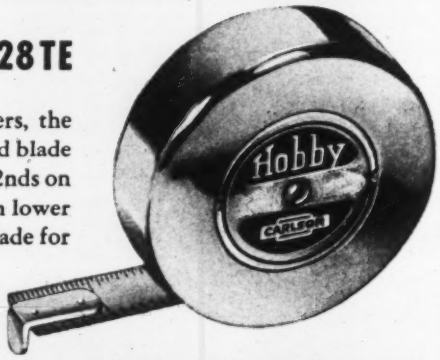
STEEL for HIGHWAYS

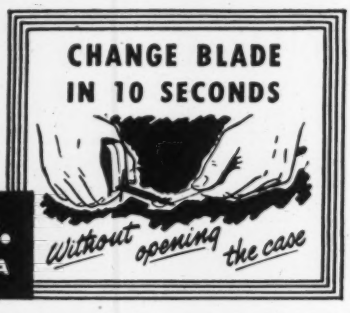
GET A CARLSON ENGINEER'S STEEL TAPE RULE

The HOBBY #128TE
(8 FOOT)

Especially designed for engineers, the Carlson Hobby 128TE, has etched blade with graduations in 16ths and 32nds on top edge and 10ths and 100ths on lower edge. Both are on same side of blade for easy conversion. The Hobby 128TE like all Carlson Rules has the famous economy feature — when blade becomes worn, you can replace it with a new one in just 10 seconds without opening the case. Replacement blades cost about ½ the price of a new rule.

GET A CARLSON ENGINEER'S RULE FOR TOP QUALITY AND REAL ECONOMY.





CARLSON & SULLIVAN, Inc.
MONROVIA, CALIFORNIA

RUST-OLEUM Stops Rust!

Rust-Oleum rust preventive gives lasting protection to metal roofs, stacks, tanks, structural steel, equipment, machinery, boilers, etc. It seals metal with a tough, enduring coating that defies rain, snow, dampness, brine, salt air, etc. Maintenance costs are cut because Rust-Oleum lasts longer, goes on quicker, and requires no extensive surface preparation.

Rust-Oleum can be applied directly over rusted metal. It penetrates the rust and incorporates it into the protective film. No sandblasting, flame cleaning, or chemical dissolvers are necessary. Just wire brush away scale and apply.

GET THE FACTS — MAIL THIS COUPON TODAY!

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2475 Oakton Street, Evanston, Illinois

Please send free copy of new Rust Oleum Catalog with recommended uses.

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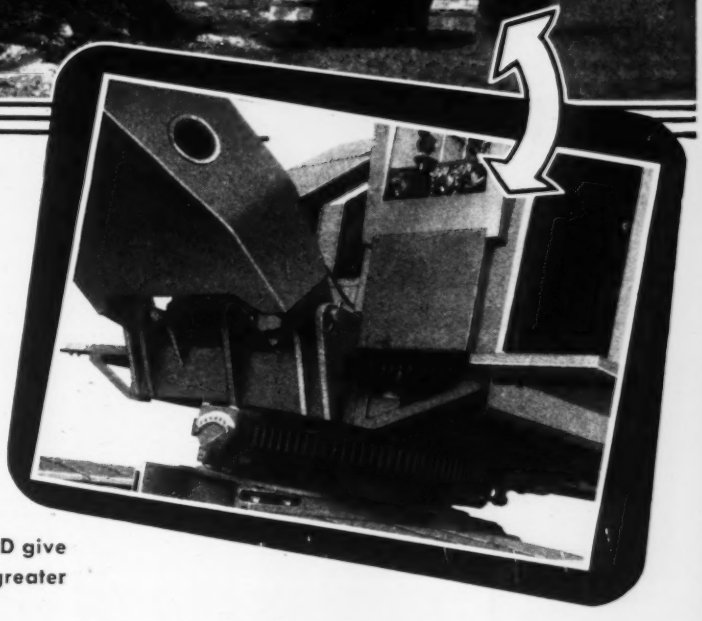
is manager of the Detroit district sales office of the CARNEGIE-ILLINOIS STEEL CORP. . . . PITTSBURGH CORNING CORP. has created a new product development group at Port Allegany, Pa., to coordinate sales and research . . . KOPPERS CO., INC., has consolidated its N. Y. divisional sales offices in the Empire State Bldg., New York City, and those in the Chicago area in the Peoples Gas, Light & Coke Bldg. . . . Robert LeFevre is on the Minneapolis district merchant trade sales staff of CECO STEEL PRODUCTS CORP. . . . Joseph P. Wright, formerly treasurer, has been elected vice-president in charge of sales for the WESTERN FOUNDRY CO., Chicago . . . Maynard B. Terry is general sales manager of the AMERICAN BRAKELOK division of the AMERICAN BRAKE SHOE CO. . . . M. H. Courtenay is Atlanta, Ga., district manager of SKF INDUSTRIES, INC. . . . F. V. Clicquennoi succeeds T. L. Hughes, retired, as western sales manager of the LEHIGH PORTLAND CEMENT CO. of Allentown, Pa. . . . O. W. Bynum has been appointed general sales manager of CARRIER CORP., Syracuse, N. Y. . . . A meeting of the mid-western sales representatives of the conveyor division of the A. B. FARQUHAR CO. was held in Chicago recently to discuss local problems in materials handling . . . F. F. Bogardus, district sales manager for ROOTS-CONNERSVILLE BLOWER CORP., Connersville, Ind., has opened an office in the Plymouth Bldg., Cleveland, Ohio . . . LINK-BELT CO. has opened a district sales office at 444 Broadway, Albany, N. Y., with J. Chas. Bullock as manager . . . John R. Quinn is now assistant product manager of the extrusion and tubing division of REYNOLDS METALS CO. at Louisville, Ky. . . . ECONOMY PUMPS, INC., has opened a new sales office at 105 W. Monroe St., Chicago, with Beldon S. Tucker as manager . . . Walter Webb has been appointed as the Philadelphia, Pa., area sales representative of the U. S. STONEWARE CO., Akron, Ohio. TRINIDAD HIGHWAY CO. INC., has been formed at Hartford, Ill., to distribute asphalt.

Distributors—ECONOMY PUMPS, INC., Hamilton, Ohio, has made Bruce Hetter distributor for western Michigan at Grand Rapids . . . LEVINSON STEEL SALES CO., Pittsburgh, Pa., has become a stocking warehouse distributor for PLASTELL PRODUCTS CO., Washington, Pa., and CONSOLIDATED STEEL WAREHOUSE CO. is distributor in the Philadelphia area . . . WATERMASTERS, INC., Houston, Tex., will represent BELCO INDUSTRIAL EQUIPMENT division in the Southwest . . . WESTCHESTER WHOLESALE WAREHOUSE, INC., Mamaroneck, N. Y., will distribute RICHKRAFT products in the southeastern part of New York state and in Connecticut. HERRICK CO., 352 C. Street, South Bos-

1 swing OR 10,000...

Heavy Loads or Light ..the Upper Body of an OSGOOD Stays Stable and in Alignment



No detail is overlooked to make an OSGOOD give you more work for longer periods, with greater efficiency and at lower cost.

For example, every turn of the upper body, regardless of load, is smooth and stabilized. In addition to the conical rollers which travel on the rotating gear, *every large* OSGOOD is equipped with hook rollers which roll *under* the rotating gear. These hook rollers, adjustable to compensate for wear, help distribute stresses evenly, keep the upper body firm and in alignment at all times.

This is only one example of the "perfection in detail" which makes OSGOOD Power Shovels, with famous Air Control, leaders for performance in their field.

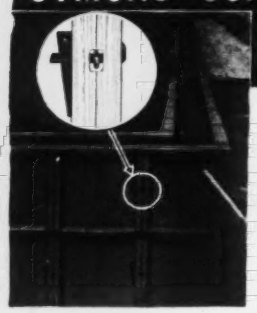
POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO. O-G THE GENERAL CO.
EXCAVATOR

MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • ⅜ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES

SYMONS CONCRETE FORMS



Your answer to low foundation costs

Here's Why!

Symons Concrete forms save you 50 to 75% of the entire labor of forming. You eliminate eleven costly steps in concrete form construction, and the following materials:

- √ Nails
- √ Lumber for more than one waler
- √ Most of the lumber for bracing
- √ Loss of lumber caused by the splitting action of nails
- √ Spreaders

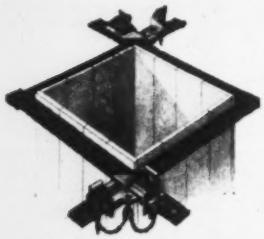
These forms can be built in your own shop . . . saving you freight . . . or you may purchase the forms complete.

Inset shows head on view of tie.

At left is cross section view of tie.

SAFETY SHORES and "Ever-Square" COLUMN CLAMPS

. . . . the builders choice



"EVER-SQUARE" COLUMN CLAMPS . . . with one piece, 90 degree angle bracket which positively squares up column. Adjustable to smallest fraction. No detachable parts. Bars of alloy steel, corner brackets of malleable iron.

ADJUSTABLE SAFETY SHORES . . . Light in weight, easy to adjust, no instructions are needed and they have greater load capacity. The lifting jack lifts like hydraulic. Malleable castings.

Symons Concrete Forms, Safety Shores and Column Clamps can be rented with 90-day purchase option. Paid rentals apply on purchase price. Write today for complete details and prices

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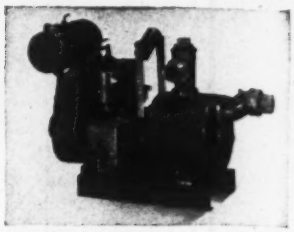
CHICAGO 39, ILLINOIS

ton 27, Mass., with branch offices in Burlington, Vt.; Hartford, Conn.; and Auburn, Me., will distribute Richkraft products in Massachusetts, Connecticut, Vermont and Maine. . . . ALL-STATE WELDING ALLOYS CO., INC., White Plains, N. Y., has appointed distributors for its line of low-temperature welding and brazing alloys and fluxes as follows: H. M. PARKER & SON, 217 West Colorado Blvd., Glendale, Calif.; HERRICK CO., 352 "C" St., So. Boston 27, Mass.; L. W. JAEGER IGNITION CO., 2040 Columbus Ave., Springfield 4, Mass.; WELDING SUPPLY CO., 65 Van Riper Ave., East Paterson, N. J.; and LITTRELL PARTS, 319 E. Sixth St., Medford, Ore.

Miscellany — SUNDFELT EQUIPMENT CO., INC., has moved to 220 Hudson St., Seattle 8, Wash. . . . BROWN INSTRUMENT CO., Philadelphia, Pa., will add over 60 percent to its manufacturing space . . . Purchase of all the common stock of BLAIR VENEER CO., North Troy, Vt., and its wholly owned subsidiary, VERMONT PLYWOOD, Hancock, Vt., by the OWENS-ILLINOIS GLASS CO., was announced jointly by W. E. Levis, chairman of OWENS-ILLINOIS and Charles T. Hall, chairman of BLAIR VENEER. . . . Embarking upon a long-range plan of product betterment, members of the SOUTHERN PLYWOOD MANUFACTURERS ASSOCIATION have moved to institute industry-wide testing of their panel products and named C. W. Dietterich, a quality control authority, to effect the program—Addition of a full line aluminum eaves-trough, conductor pipe and fittings has been announced by NEW HOLLAND METALS CO., Mountville, Pa., a division of the New Holland Machine Co. . . . the K.B.S. MINERAL WOOL CO., Omaha, Neb., has been organized to make insulation . . . Johnson Metal Products Co. of Erie, Pa., manufacturers of metal frame windows and door screens, metal framed storm windows and other metal hardware items, has been merged with DETROIT STEEL PRODUCTS CO. and will continue to operate as the ERIE DIVISION of the latter firm.

Japan—The Japanese Reconstruction Board proposes to construct a dual-purpose dam at Numata, Gumma Prefecture, on the Tone River. The primary purpose of the 350-ft. dam is to control the Tone River which last fall flooded large sections of Tokyo and the Kanto Plain. In addition, plans call for construction of a 15,000-kw. generating station. At present this course is figured at Yen 20 billion ($90 million to $100 million at the unofficial exchange rate).

CARTER



HUMDINGER SELF PRIMING CENTRIFUGAL PUMPS

Performance — Stability — Economy — three words which embody the CARTER tradition for producing the best! Every buyer knows that it's experience which counts. You, the customer, know that only a well-tried and proven product can be relied on to do the job.

When you choose CARTER you get over fifty years of manufacturing experience in the finest pump engineering skill has developed.

Write for Bulletin 4503

RALPH B. CARTER CO.
HACKENSACK, NEW JERSEY
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LONG EXPERIENCE AND EXTENSIVE FACILITIES FOR ENGINEERING AND CONSTRUCTION IN GUNITE

- Lining for tunnels, mines, steel bins and hoppers
- Lining old, tuberculated, or clogged water mains to renew life and increase flow capacity
- Rehabilitation of dams, docks, bridges and walls
- Restoration of spalled, weathered or damaged concrete buildings
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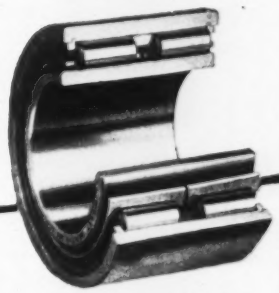

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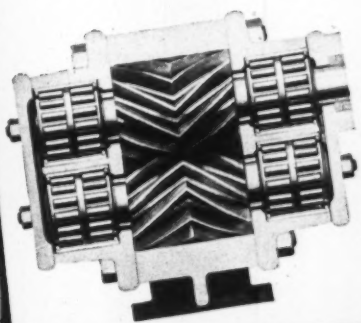
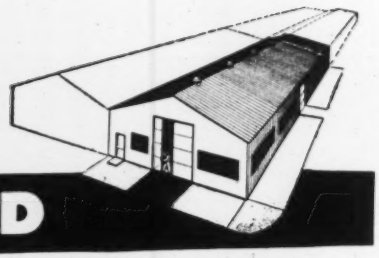


Success in "unusual" applications like this simply goes to show that in any kind of application—wherever you need dependable bearings you *WIN* WITH HYATT. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

LURIA STANDARD BUILDINGS



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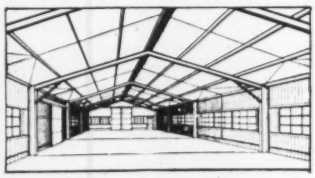

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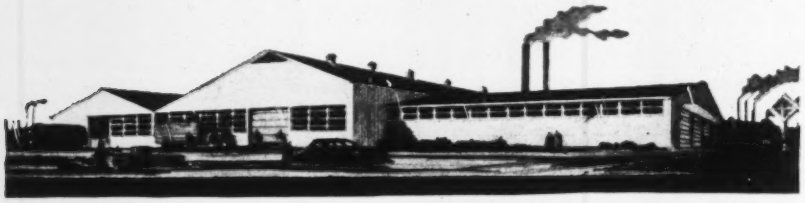

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Engineering School News

The National Society of Professional Engineers has filed a protest with the House Armed Services Committee against the drafting of students in accredited engineering schools, believing that the interest of our national defense and the welfare of the country require exemption or deferment in the case of engineering and scientific students.

The inauguration of T. Keith Glennan as fourth president of Case Institute of Technology occurred May 20-21. It was featured by a symposium on "The Increasing Responsibility of the Scientist and Engineer in Public Affairs."

A very large water tunnel will be built at the Ordnance Research Laboratory at Pennsylvania State College for research on torpedo propellers. This is the hydraulic counterpart of a wind tunnel, and will be used in research on the design, modification and improvement of propelled underwater devices, in much the same way as a wind tunnel is used in tests for airborne devices.

The circulating tunnel will be 97 ft. long and 31 ft. high. The test or working section will have an inside diameter of 48 in. and will be 14 ft. long, large enough to permit testing models more than 8 in. in diameter and 8 ft. long. The tunnel will provide a smooth, streamlined flow of water in which such models can be tested with a maximum velocity greater than 60 ft. per second, or 40 miles per hour.

Prof. Norman L. Towle, acting dean of The Cooper Union School of Engineering, New York, since the death of Dean George F. Bateman last January 29, has been appointed dean.

Architectural plans for the construction of a general engineering laboratories building—expected to cost around $100,000 exclusive of equipment—at North Carolina State College, Raleigh, N. C., have been completed and contractors' bids are expected to be asked for soon.

Recently the school of civil engineering and engineering mechanics in cooperation with the technical extension division, Purdue University, conducted a short course on airphoto identification of soil patterns, designed to teach the technique of evaluating soils for engineering purposes from aerial photographs. The method applies to loca-

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Capacity:
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NEW MallSaw Table Stand
Latest accessory for Model 60 MallSaw. Height 39"; Table area: 16" x 18"; Capacity: 1-15/16".

For practically every type of cut . . . in almost any material . . . as a hand saw or a table saw . . . use the Model 60 Mall Saw. Interchangeable saw blades and abrasive discs . . . and a handy, lightweight table stand—complete with rip fence and mitre guide assembly—equip it for countless uses on the building area. Other models with 2¼", 2⅞" and 4½" capacities are also available for 110-volt AC-DC or 220-volt AC-DC.

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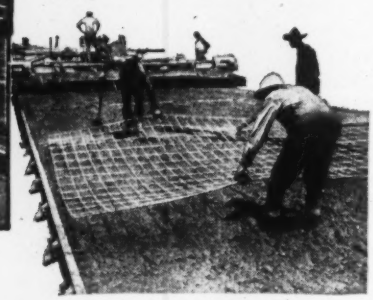

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tion, construction, design and maintenance of highways, railroads and airfields. The short course dealt primarily with the more common surface rock and soil materials of the continental United States. The regional aspect of the relationship between soils, engineering problems, and airphoto patterns, was stressed as part of the basis for the approach to understanding the techniques used.

The college of engineering of the University of Michigan is offering a special summer symposium on "Dynamics of Stress and Strain," conducted by the department of engineering mechanics. The courses, seminars and lectures will treat of dynamics of machines and structures, elasticity, plasticity, creep, fatigue, metallurgy of engineering materials, and their engineering applications.

The hydraulic laboratory of the St. Paul district, Corps of Engineers, has been moved to the University of Minnesota from the University of Iowa, where it has been for 19 years. Facilities are now available at the Minnesota campus for river improvement studies, according to Col. W. K. Wilson, Jr., St. Paul district engineer, and the transfer was made to simplify supervision of the laboratory work and to permit tests to be more readily coordinated with the prototype design in the district office.

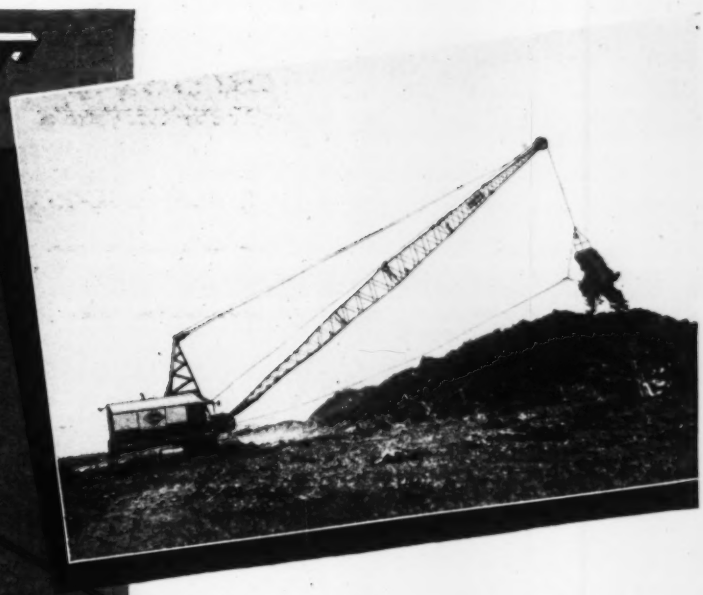
The University of Wisconsin graduate school next fall will offer to professional engineers master's degree in engineering without requiring attendance at classes in Madison, although applicants must go there at the beginning of the semester to register.

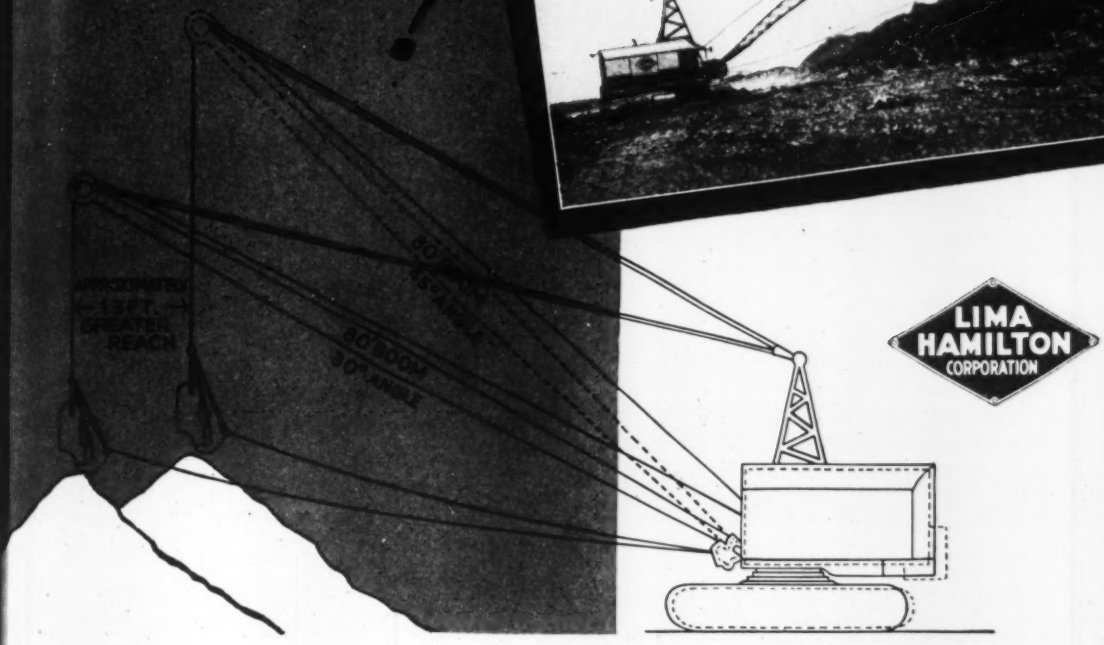
A survey of 117 engineering graduates of the college of engineering and architecture at the University of Nebraska showed that 65 of them are engaged in farming, banking, insurance and manufacturing. The great majority of them said that their engineering training had been of much value in their work.

Byron E. Short is acting dean of engineering at the University of Texas as Dean W. R. Woolrich begins a one-year leave of absence to go to London on a research assignment from the State Department. Professor Short holds degrees from the University of Texas and Cornell.

A 15-to-20-yr. research program, covering its entire curriculum, is announced in the annual report of the California Institute of Technology. The report also announced that since 15 Army engineers are working for mas-

It's the ANGLE OF THE BOOM THAT Counts!





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Most dragline work requires the spoil be cast as far back from the cut as possible. Long Booms for such a purpose mean only extra weight if the dragline isn't capable of handling a long boom and load at a low angle. Working range does not depend so much on the length of the boom as it does on the angle at which the boom can be worked without tipping the machine. The accompanying sketch illustrates a comparison in working radii of a well balanced LIMA dragline equipped with an 80 foot boom and a 3 cubic yard bucket, working at 30 degree angle and a light weight machine equipped with the same length boom and bucket capacity, but which must be worked at 45 degree angle to avoid tipping. LIMA draglines are designed and built for dragline work. Low center of gravity, proper balance, long wide crawlers and big drums, all important advantages for successful dragline operation. Get the facts when you buy your next dragline.

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The Monroe Corporation, builders of the 10-million-dollar Windsor Village in Indianapolis, bought one Dumpcrete last July and a second in August. These "paid for themselves in 18 weeks." No wonder they bought two more.

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ters' degrees in the engineering department, and that intensive studies of mechanics, sewage disposal, water pollution and earthquake effects have been made.

John B. Koepfli, of the California Institute of Technology faculty, has gone for England to become adviser on engineering and other problems to the United States State Department mission on science and technology. He will be abroad one year.

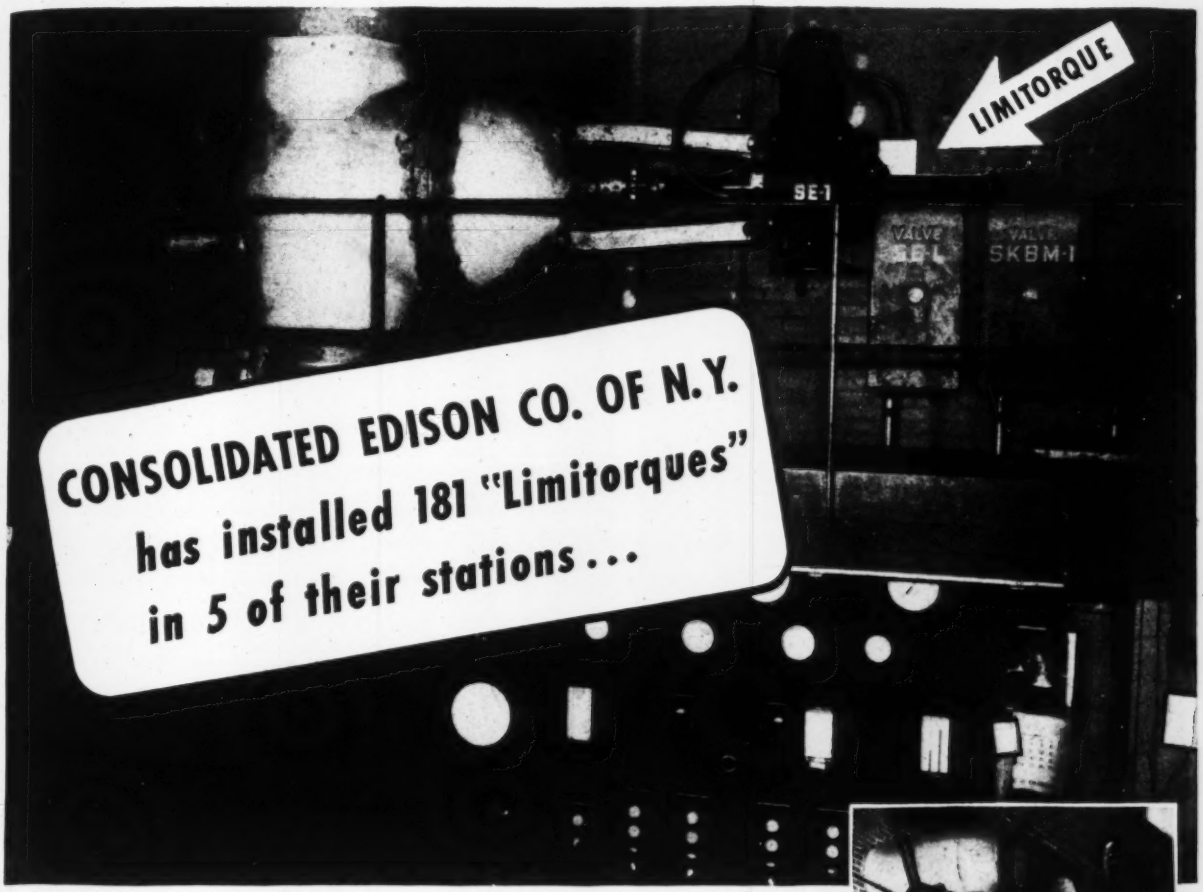
James S. Murray has been appointed associate professor of materials in the department of building engineering and construction, Massachusetts Institute of Technology. He will have charge of the masonry materials research laboratory. Professor Murray was graduated from Harvard University in 1924, then joined the staff of the National Bureau of Standards, Washington, and became chief of the lime and gypsum section of the building materials division.

Gerald G. Kubo, now assistant professor of civil engineering at the University of Connecticut, Storrs, Conn., had been an instructor at New York University. With a masters degree in civil engineering from MIT, 1939, he has had five years experience with the American Bridge Co.

J. W. Brooks, now associate professor in civil engineering at Queen's University, Kingston, Ont., was formerly structural engineer for Spruce Falls Power and Paper Co., Ltd., at Kapuskasing, Ont. A graduate of Queen's University, 1939, Professor Brooks was engaged for several years in structural design for H. G. Acres and Co., consulting engineers, in connection with the Shipshaw hydroelectric power development at Arvida, Que.

The Metropolitan Conference of student chapters of the American Society of Civil Engineers has inaugurated a program to provide summer employment for undergraduate civil engineering students in its area. Members of the eight schools of the conference (C.C.N.Y., Columbia, Cooper Union, Manhattan, Newark, N.Y.U., Rutgers and Polytechnic Inst. of Brooklyn) are cooperating to carry out the plan, for which the conference acts as an intermediary between the student engineers and prospective employers.

During the week of June 7 to 11 short courses for sewage and industrial waste treatment plant operators, and superintendents will be held at the



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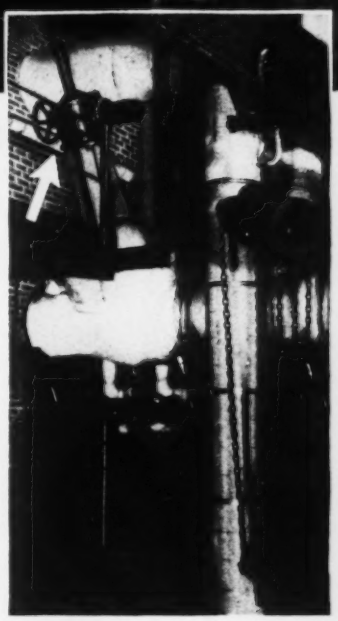

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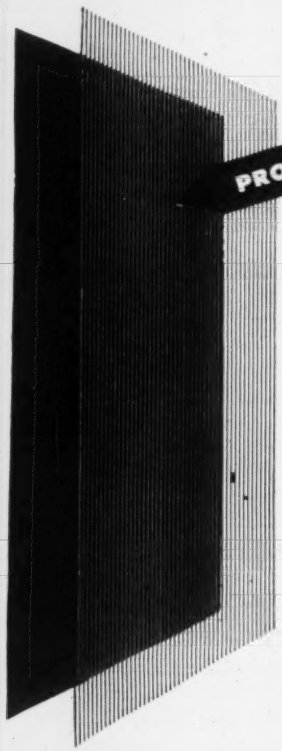

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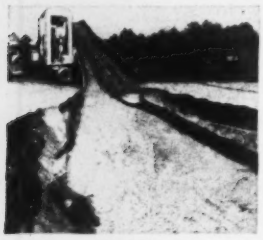
SAUERMAN LONG RANGE MACHINES



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Pennsylvania State College under the auspices of the sanitary engineering staff. The courses are sponsored by the Pennsylvania Sewage and Industrial Wastes Association, the Pennsylvania Department of Health, and the Pennsylvania State College. The total expenses per student will be about $35 for the 5 days. Programs of the courses, application blanks and other information may be obtained from the Department of Sanitary Engineering, The Pennsylvania State College, State College, Pa.

Arthur T. Ippen has been promoted to full professor of civil engineering at the Massachusetts Institute of Technology. Other promotions are Howard Simpson to assistant professor department of building engineering and construction, and Henry M. Paynter, Jr., instructor in the department of civil and sanitary engineering.

Allen T. Bonnell has been named vice-president of Drexel Institute of Technology in charge of the development and expansion program. Plans for five new buildings were announced last fall. They include buildings for science, physical education, the library, engineering and student dining halls. Mr. Bonnell has been on the faculties at the University of Illinois, St. Louis University, and the University of North Carolina, and he has been director of the Division of Residual Operations and Records, UNRRA.

Under its policy of providing for a maximum selected enrollment of 500 engineering students, Vanderbilt University, Nashville, Tenn., has started to curtail its enrollment, currently 700 students.

Ten fellowships in traffic engineering for 1948-49 are available to residents of the continental United States, the Bureau of Highway Traffic at Yale University has announced. The course provides a broad foundation in techniques of traffic operation and gives the student skill in the analysis of traffic problems. The course of graduate study and research is open to men who have received a degree in engineering from an accredited college.

The ten fellowships amount to $1,400 each and provide a full academic year of graduate study beginning next Sept. 20. They include a living stipend of $800, tuition fee of $400 and a maximum of $200 to each fellow for his individual research project.

Application blanks may be obtained from the Bureau of Highway Traffic, Yale University, Strathcona Hall, New Haven 11, Conn. The closing date for application is June 15.

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